Welding Engineer

PRICE 50 CENTS

JUNE, 1958

Jackson Electrode Holders, Ground Clamps, Cable Connectors, Splicers and Lugs
Jackson Safety Hats, Welding Helmets, Goggles and Eyeshields
Sold World-Wide through Distributors and Dealers

Jackson Products

JIM HINCTION SALES DIVISION OF AIR REDUCTION CO., INC.

WARREN • MICHIGAN

FIBRE-METAL

Monarch® FACE SHIELDS

. . . give you EVERYTHING for safety and long life!

Model F-300

SPARK DEFLECTOR

RUGGED CONSTRUCTION for Full Protection

LIGHT WEIGHT

PREFORMED WINDOWS

NON-METALLIC BINDING

CLEARANCE FOR GLASSES

REPLACEABLE PADDED GENUINE LEATHER SWEATBAND

WIDE RANGE RATCHET HEADSIZE ADJUSTMENT (Patented)

NO HAIR PULLING!

HINGED OFFSET HEADGEAR, SECURE, COMFORTABLE — POSITIVE FRICTION JOINTS INSTANT "ON or OFF" POSITIONING

ACCESSORY EQUIPMENT (All Interchangeable):

FOR WELDING AND SCARFING

GENERAL PURPOSE WINDOW
Four sizes clear or three shades of green.

FOR HEAT PROTECTION
Screen (24-mesh)

SEND FOR BULLETIN NO. 41

COMFORTABLE AS AN OLD HAT, this Monarch® F-300 Face Shield gives you ALL that Fibre-Metal's long and successful experience in designing and engineering really practical protection can deliver. It is economical because of Fibre-Metal's large and efficient production equipment and methods. You get more because of its comfort and durability . . . and versatile safety uses! Maximum safety to eyes and face bring peace of mind, better and more profitable workmanship. Be sure your face protection is by FIBRE-METAL!

THE FIBRE-METAL PRODUCTS COMPANY CHESTER, PENNSYLVANIA

THE WORLD'S LARGEST MANUFACTURER OF SUPERIOR PROTECTIVE EQUIPMENT

WELDING HELMETS • FACE SHIELDS • SAFETY HELMETS • HEAD REST GOGGLES • SAFETY CAPS & HATS • FRESHAIR SYSTEMS

"For fast, X-ray sound welds, we used Hobart No. 10 welding electrodes to join sections of 208-foot long rigid frames for the University of Tennessee Field House above," says William E. (Bill) Smiddy, Erection Superintendent for Crane and Truck Service, Alcoa, Tennessee.

FOR SPEED AND STRENGTH, prominent builders depend on HOBART No. 10 ELECTRODES

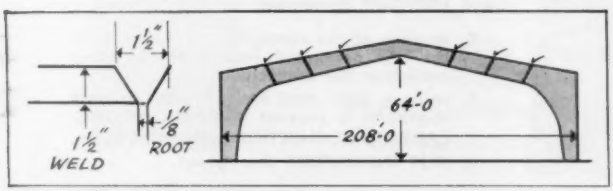
Photo shows seven of nine arc welded rigid frames in place for the new University of Tennessee Armory and Field House. The eighth frame is being assembled on the ground in back of the bulldozer. After the seven shop fabricated sections were joined with Hobart No. 10 electrodes and every weld joint X-rayed, the 57½ ton rigid frame unit was lifted into place by four 30 ton motor cranes. Considerable time and money was saved by assembling, welding and X-raying each rigid frame on the ground and erecting it as a unit.

The roof frame of this clear span structure is just as clean cut as the floor frame; no trusses, no bracing to clutter up the graceful outline of the structure and, consequently, no obstruction to light or the spectator's view of the performance. Size of the framework for the building is 220 feet long and 208 feet wide. Height of framework at center is 64 feet. The building, when completed, will have 7,000 permanent and 3,000 temporary seats.

Seven shaped beam and column sections for each rigid frame were fabricated in the shops of Tucker Steel Corp., Knoxville, Tenn., and trucked to the job site. The bulk of the work was done at the fabricating shop for speed and economy.

Erection time for the framework was 63 days. Six welding operators used over 2¼ tons of Hobart No. 10 electrodes to make the field splices. Current was supplied by six 300 ampere portable gasoline engine driven welders. Every welded joint was X-rayed by Pittsburgh Testing Laboratory, Birmingham, Alabama.

For faster welding where X-ray sound welds are a must, specify Hobart No. 10 electrodes. They tested better than other makes for this job and they will test better for yours. Try them. **HOBART BROTHERS CO., BOX U-68, TROY, OHIO, Phone FEderal 2-1223.**



HOBART TROY OHIO WELDERS

300 Amp Gas Drive

250 Amp "Contractor's Special"

250 Amp "Big Brother"

---CLIP THIS HANDY COUPON . . . MAIL TODAY!---

HOBART BROTHERS CO., Box U-68, TROY, OHIO

☐ Yes, I would like to try samples of Hobart No. 10 electrode size ___.

☐ Send me more information on: ___ amp capacity gas drive
☐ "Contractors Special"
☐ "Big Brother"

Name _____

Firm _____

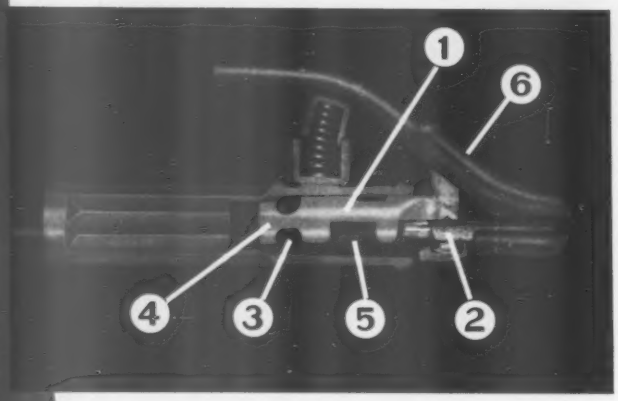
City _____ *Zone* _____ *State* _____

Send complete catalog on
☐ Arc Welding Electrodes ☐ Machines
☐ Send free copy of "Weldors Vest Pocket Guide"

CADDY®

TYPE B ELECTRODE HOLDERS

COOLER, LIGHTER LONGER LASTING



COOLER because the CADWELD CONNECTION ELIMINATES.

hot spot current bottlenecks • soldered connection meltouts • mechanical connection loosening • mechanical connection corrosion • connection resistance

LIGHTER because:

1. a lightweight stamped steel body replaced the heavy long cast body.
2. design permitted the use of a short beryllium jaw.

Last LONGER because:

3. location of the connection of the cable to the jaw prevented flexing of the cable strands at the connection.
4. cable gripper ears are crimped on cable insulation to prevent insulation creeping.
5. CADWELD CONNECTION outlasts the cable.
6. BEST INSULATORS throughout.

CADDY® Arc Welding Accessory Div.

Erico Products, Inc.

2070 E. 61st Place • Cleveland 3, Ohio

IN CANADA ERICO INCORPORATED, 3571 Dundas St., West, Toronto 9, Ontario

Vol. 43 — No. 6

The magazine of joining and severing materials

Welding Engineer

This is welding: June, 1958

Welded trusses support newest NYC skyscraper 34
▶▶▶▶▶▶ **F. T. Tancula** reports on five of the largest welded trusses ever fabricated and gives a detailed account of the welding operations needed for this huge job.

Welding helps raise the roof 37
When the Air Force academy opens this September, cadets will dine under a roof 15% lighter because of welding.

New process features close control of brazing heat 38
A new development offers promise for high-temperature brazing of aluminum and magnesium by means of accurate heat control.

Arc-air for beveling cuts milling time 75% 40
Visiting a manufacturer who must produce long-lasting equipment at low cost, **Jack Fairlie** learns how arc-air torches slash beveling expenses. A companion piece summarizes a switch to automation.

With the AWS in St. Louis 42
Welding Engineer staff members report on the events, elections, and people at this year's AWS show in St. Louis.

Filler wire is the key to better titanium welds 45
James H. Johnston and **Edward F. Funk** detail the steps for choosing and proper use of filler wire when welding one of the most difficult of metals . . . titanium.

Automated welding line produces 500 units per hour 49
Another giant step is taken with automated welding lines by a manufacturer of automobile floor-pans.

Is the trend toward smaller, localized welding shows? 50
A report from California indicates welding shows may be growing smaller and centering at more accessible locations.

Curtain-wall "clothes" Manhattan building 52
▶▶▶▶▶▶ 174,000 sq ft of welded aluminum curtain-wall adorns a new, 34-story office building.

Automatic control guides welding heads over any seam line 67
Moving like a well-trained hunting dog, these welding heads unerringly follow the path of any seam.

Also in this issue:

Does he use America's oldest torches? 54
100% X-ray possible on manways 56
New welder makes debut 60
Salvaging silver from brazed honeycomb 62
Ingenuity defeats stumbling block 68
Who is a certified weldor? 70
H & H opens new California metal plant 76

Regular **WE** features . . .

News 7
Your WeldWorld at press time 13
Letters 24
Between passes 29
Editorial: *Hanged by mistake* 31
Welding Clinic: *Production of oxygen* 58
Data Sheet No. 213: *Analysis of titanium* 75
On the job 78
New products 80
People 91
30 years ago 101
Free literature 102
The Welding Shopper 103
Advertisers in this issue 104
Literature offered in ads 104
Welding Info-Aids 105

Published monthly, with an additional directory number in June, by Welding Engineer Publications, Inc. Entered as second class matter Aug. 23, 1948, at the Post office at Chicago, Ill., under Act of March 3, 1879. Printed in U.S.A. Tear sheets of many Welding Engineer articles are available free of charge up to 3 months following date of publication.

©1958 by Welding Engineer Publications, Inc.

P&H welding positioner saves 90 hours in welding time

The P&H WP-80 — world's largest power-elevating positioner — is the only welding positioner made that can power-elevate 40-ton weldments.

Savings come big when you use P&H welding positioners in your welding operations. Here's proof — the results obtained by using a P&H WP-80 positioner in welding the power-shovel frame shown above:

The weldment is 12 ft. wide, 35 ft. long, 3½ ft. high, and weighs 59,000 lbs.

Downhand welding permitted depositing much heavier first-run beads, thus eliminating stringer beads. The number of passes in most cases dropped from three to one. The result: *a cut of 90 hours in welding time alone!* And the number of crane lifts was slashed from 32 to 9.

With the WP-80, work interruptions dropped sharply — safety was greatly improved. That's because, once the piece is secured on the positioner, the operator can position it at any angle quickly and easily by remote control.

P&H offers you a complete line of welding positioners in capacities from 500 to 100,000 lbs. — with variable speed, if you desire. For more facts, get a copy of "What you should know about welding positioners." Write to Dept. 309C, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

HARNISCHFEGER

P&H WELDERS • ELECTRODES • POSITIONERS

Welding Engineer

America's pioneer publication which, combined with The Acetylene Journal, has been devoted to the interest of the welding and allied industries since 1898

•

WELDING ENGINEER PUBLICATIONS, INC.
P.O. Box 28
Morton Grove, Ill.
Telephones:
ORchard 4-5130, IRving 8-3355

•

TED B. JEFFERSON
Editor and Publisher

•

FELIX T. TANCULA
Executive Editor

•

JACK FAIRLIE
Managing Editor

•

ROBERT KULAR *(M.L.)*
F. W. FOERSTE
G. J. CANNIZZO
Assistant Editors
SHIRLEY WELTON, *News Editor*

•

ROBERT M. DAVIS, *Production*

•

LLOYD GOSSMAN, *Circulation*
JIM BREWSTER, *Circulation Promotion*

•

WARREN WARE
Western District Manager
P.O. Box 28
Morton Grove, Ill.
Telephones:
ORchard 4-5130, IRving 8-3355

•

HERMAN PHELPS
Eastern District Vice President
P.O. Box 128, White Plains, N. Y.
Telephone: WHite Plains 9-3876

•

MEMBER
American Welding Society
International Acetylene Association
Compressed Gas Association
National Welding Supply Association
Audit Bureau of Circulations

•

Single copies 50 cents. Subscription rates: United States and possessions $3 per year; $4 for two years; $5 for three years. Canada $5 per year; $8 for two years; $10 for three years. All other countries $15 per year; $25 for two years; $30 for three years. Position and company affiliation must be indicated on subscription form. Allow one month for change of address.

WELDING ENGINEER is indexed regularly by Engineering Index, Inc.

VICTOR CUTTING TORCHES AND TIPS

. . . because he can always count on Victor to fill his needs. Shown here is one of Victor's **new** LPCG series . . . available for both hand and machine cutting with **new** natural and propane preheat gas cutting tips.

Remember, Victor torches perform best when you use genuine Victor cutting tips. Order from your Victor dealer now and cut your costs with Victor cutting tips.

VICTOR for welding

48

VICTOR EQUIPMENT COMPANY

Mfrs. of welding & cutting equipment; high pressure and large volume gas regulators; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

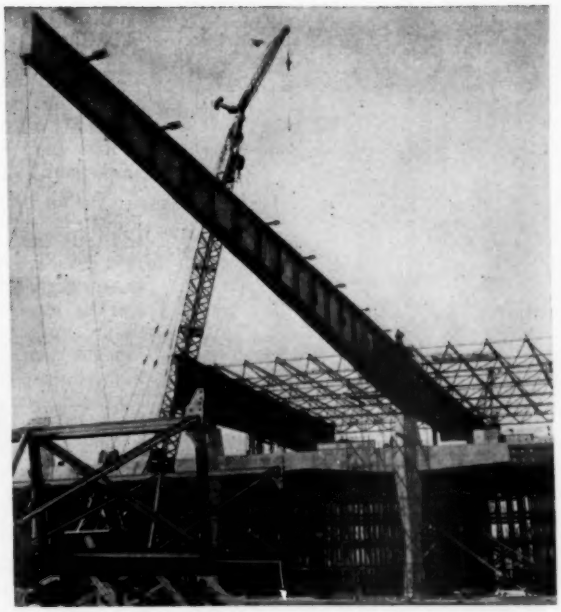
844 Folsom St., San Francisco 7 • 3821 Santa Fe Avenue, Los Angeles 58
1145 E. 76th St., Chicago 19
J. C. Menzies & Co., Wholly-Owned Subsidiary

NEWS

Welded plate girders for huge jet hangar

The largest welded plate girders ever made in this country—each 365 ft long and 125 tons—have been fabricated for a new jet hangar, big enough to house four DC-8 jets and two DC-7 propeller-driven planes. Pacific Iron & Steel Corp., Los Angeles, built the hangar, near San Francisco's International Airport, for United Air Lines. Arc welding was used to fashion seven girders from plate steel 3 to 6 ft wide and 20 to 35 ft long. Hobart welders were used for field splices at three locations on the five intermediate girders.

Plate girders cantilever 142 ft beyond each side of an 81 ft wide core of reinforced concrete. Girders are spaced at 51 ft 6 in. centers and support a series of inclined trusses, which not only support roof purlins, but provide lateral bracing for girders and roof structure as well. There are no supporting columns in the work area.



THESE girders help support a new jet hangar which United Air Lines is building near San Francisco's International airport. They are reportedly the largest welded plate girders ever made in this country. *(See story)*

New turnpike bridges welded

The Yankee Doodle Bridge, spanning the Norwalk river, is one of the 28 all-welded bridges on the new Connecticut Turnpike. The largest of the bridges is the 24-span, 2,661 ft Mianus River Bridge at Greenwich. The smallest is a single span of 103 ft over route 161 at East Lyme. The Turnpike's bridges are among the country's longest with welded plate girders. Most are two or three-span road crossings between 175 and 225 ft long.

Connecticut, long a leader in welded construction, saves from 10 to 20% through welded bridges, reports Lincoln Electric Co., Cleveland. Lincoln is currently sponsoring a series of seminars on welding in bridge design.

BELOW: One of 28 all-welded bridges on the Connecticut Turnpike. Bridges are among country's longest with welded plate girders. *(See story)*

Budd designs, welds multi-walled tank

More than 150,000 welds were made in fabricating a large multi-walled tank designed by the Budd Co., Philadelphia, for General Electric's Aircraft Nuclear Propulsion Dept. The tank was a year in the making, and over 50,000 X-ray pictures were taken for weld inspection.

Budd used a variety of high temperature alloys in sheets and structural forms for the tank. It is of light construction and is strong and stable under high temperature and load gradients, Budd reports. The unit was recently delivered to the AEC's National Reactor Testing Station in Idaho for final testing.

July 31 deadline for Gregory Award

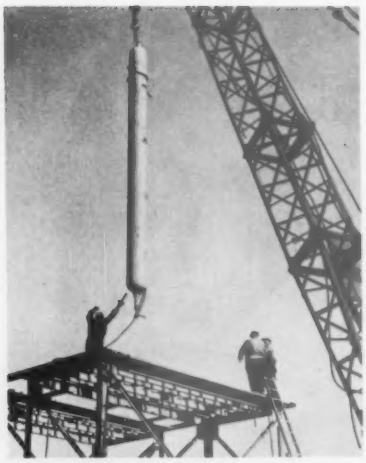
July 31 is the last date entries will be accepted for the second annual Gregory Award, given for the most significent contribution in stud welding. A cash award of $1,500 or $2,000 in scholarships will go to the winner. A complete stud welding unit will be given the engineering school or college whose students and faculty turn in the most outstanding group of entries.

Entries are judged on ability to 1) reduce costs for industry, 2) improve the appearance, serviceability and life of a product or structure or 3) perform a function not possible by any other method. Papers should be in early, says Gregory Industries, Inc., sponsor of the contest.

Judges, picked from the metal industries, are: Chairman, Dr. Clarence H. Lorig, Battelle Memorial Institute, Columbus, Ohio; Robert Bennett, Alco Products Inc., Schenectady, N.Y.; Theodore L. Oberle, Caterpillar Tractor Co., Peoria; Gustav Schrader, Steel Improvement & Forge Co., Cleveland; and Wilson Scott, Westinghouse Electric Corp., Sharon, Pa. The award will be presented at the October 28, 1958 Award Luncheon of the American Society for Metals in Cleveland. Information is available from Gregory Industries, Inc., Lorain, Ohio.

Name change for Welding Sales Co.

W. Orange, N.J.'s Welding Sales Co. has changed its name to Gasarc Welding Sales Co., President James D. Bluhm reports.



SWINGING into place is a new welded cylinder used in wind tunnels. Firm saved money by welding 39 steel cylinders to form the air storage receiver. *(See story)*

Welded cylinders for wind tunnel

Welding eliminated the expense of getting one large high-pressure vessel for a new wind tunnel. Burns & Roe, Inc., designers of the supersonic and transonic tunnels, used 22 ft-long sections of high strength pipe—an off-the-shelf item—swaged the ends and welded them to a common header system. Thirty-nine of these steel cylinders form the air storage receiver of Republic Aviation Corp.'s new wind tunnel—taking the place of one large vessel. Pump-up pressure in the cylinders is 3,000 psig—enough for tests ranging from 40 seconds to over 3 minutes at four times the speed of sound.

FORMOSAN weldor Ho-Chung Hsai gets pointers from Walter W. Kirtley, instructor at the Lincoln Welding School in Cleveland. *(See story)*

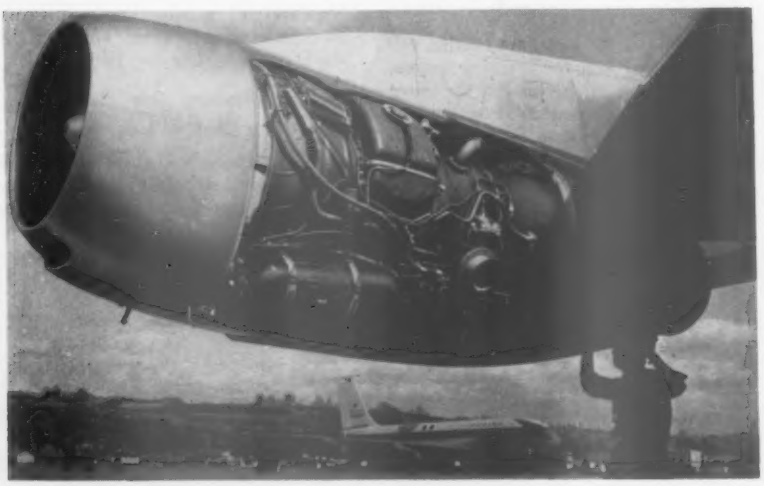
Formosan weldor studies at Lincoln

Ho-Chung Hsai, superintendent of a large railroad car manufacturing and repair shop in Taipei, Taiwan (Formosa) recently studied arc welding at the Lincoln Welding School in Cleveland. He took a nine-week course to learn the latest methods of teaching arc welding and to improve his own welding. The instruction was sponsored by the Foreign Operations Administration of the U.S. government.

Arc welding used on Explorer I

Used to seal the skin of the nation's first satellite, Explorer I, was one of Miller Electric Mfg. Co.'s arc welding machines. Featuring remote control of welder and gas and water valves, the machine is in general use in the aircraft and missile industry for metallic arc welding and the various inert gas processes.

BELOW: Pear-shaped metal container which fits in engine pod of this Boeing jet is all-welded. *(See story)*



Schools to get surplus tools

The changing pattern of defense production has already out-dated about 13,000 machine tools and equipment owned by the government, and more will be available in the future. These tools will be released to state and local educational institutions, reports H. B. McCoy, administrator of the Business and Defense Services Administration of the Department of Commerce.

Actual distribution will be handled by State agencies, working with the Department of Health, Education and Welfare. The Metalworking Equipment Div. of BDSA is reviewing schools' needs.

All school officials should let the director of the State agency for surplus property know their needs. "The most effective use for our surplus tools is in our schools, where they can train our youth, contribute to mobilization planning and at the same time provide a service to industry," says N. A. Olsen, director of the Metalworking Equipment Division.

Coated abrasive show set for June 10-13

Manufacturers of coated abrasive machine tools will demonstrate new products in the Third National Coated Abrasives Machinery Show June 10-13 at Troy, N.Y. This year's show will be in the new $1 million Product Engineering building of Behr-Manning Co., a division of the Norton Co., which sponsors the event.

New machinery includes a giant grinder for mechanical descaling and heavy stock removal, using a coated abrasive belt 50 in. wide; a 40-ft longitudinal polisher for tube, bar and extruded sections and a centerless grinder with fully automatic gaging.

New weld techniques on jet's air container

One of the engine pods on the Boeing jet tanker aircraft incorporates a welded, 295 cu in. metal container storing air at 3,000 psi. Developed and manufactured by Walter Kidde & Co., Inc., New York City, the container provides compressed air for the fuel air starter system on the engine.

The pear-shaped container consists of a large conical section and

(Continued on page 93)

here is an additional line every welding supply distributor can handle profitably

whether or not you are now handling our line of welding and flame cutting apparatus these many air-gas torches will be of interest to you and can be handled by you at a desirable profit. Our brochure No. 8 illustrates and describes equipment which is noncompetitive but supplementary.

Is natural gas scheduled to replace a manufactured gas in your territory? If so, we have something of special interest to you and your Gas Company. If this conversion has been made in the past, we have equipment your customers will be interested in. We have designed, produced and used torches and other items for the control of flammable gases since 1910; and we have cooperated with gas manufacturers and public utility companies for many years. Please look at the column to your right for a partial listing of some of the torches our brochure illustrates and describes in a colorful and interesting manner . . . **write for it today**

here is a partial list of torches and operations listed in our Brochure #8:

ribbon flame burners for the glass blower and others . . .

crossfires for all fuel gases and either compressed air or pure oxygen . . .

small bench blowpipes for laboratories, radio technicians, electricians, orthodontists and others . . .

air-gas mixers for many purposes and in all capacities . . .

fine needle valves in all sizes . . .

a modern alcohol blowpipe for glazing, heat treating of molding compounds, smoothing wax surfaces or working with plastics . . .

cannon fires which can use many fuel gases with air or oxygen . . .

small air-gas torches for hand or bench use . . .

preheating torches in all sizes and capacities . . .

NATIONAL welding equipment company... 218 fremont street san francisco 5 california

it's made by National of . . . california

540 DEPT.

to twist a rocket's tail...

Kaiser Steel's Montebello Fabricating Plant uses A. O. Smith electrodes in fabricating 54-ton flame deflectors that tame the flame in rocket engine tests

When you test a rocket engine, there's literally "hell to pay" in terms of heat, thrust and distortion. To tame the rocket's flame, Kaiser Steel's Montebello plant builds water-cooled, 54-ton flame deflectors. Consisting of 18 individual castings, each deflector requires over 5,000 lbs of electrodes.

Kaiser Steel is using A. O. Smith SW-15 (E-6013) and SW-44 (E-6024) electrodes for the job.

It's just one of many cases in which A. O. Smith can provide the answers to unusual as well as routine welding problems. For more details, contact *your* man from A. O. Smith or write direct.

Half-sections of 54-ton unit requiring over 5,000 lbs. of A. O. Smith electrodes.

The man from A. O. Smith

Jim McKinney is the A. O. Smith representative who worked with Kaiser Steel. More than a salesman, he's a welding specialist, ready and eager to help you with any of your welding problems.

Through research ...*a better way*

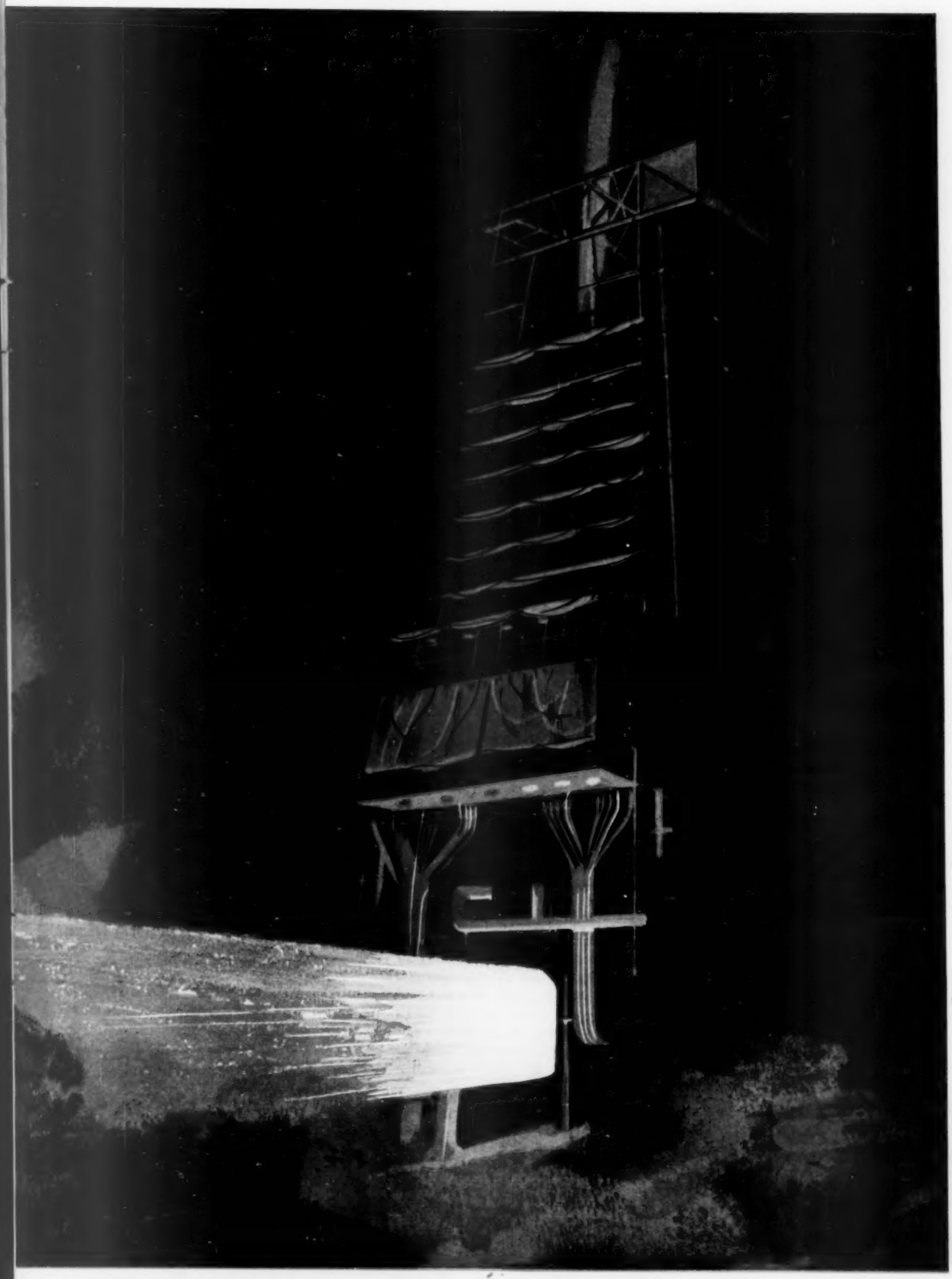
A.O.Smith

CORPORATION

WELDING PRODUCTS DIVISION

Milwaukee 1, Wisconsin

A. O. Smith INTERNATIONAL S. A., Milwaukee 1, Wisconsin, U.S.A.



This 70-foot towboat, and two 120-foot boats, were constructed in stainless steel from the main deck down, for service at U. S. Steel Corporation Clairton Works, Pittsburgh.

Some of the 20 Vickers Controlarc welders in service at St. Louis Shipbuilding and Steel Co.

"Sewing a seam" in stainless steel with the VICKERS Controlarc DC Welder

Vickers Controlarc DC Welders played an important part in an unusual project by St. Louis Shipbuilding and Steel Company: the construction of the first inland waterway towboats with stainless steel hulls. The three boats were built for service on the Ohio and Monongahela Rivers at U. S. Steel Corporation's Clairton Works, Pittsburgh.

A big feature of the Controlarcs' performance on this job was elimination of stub loss on stainless steel electrodes by *automatic* maintenance of a constant current setting from arc strike to end of pass. With a ton and a half of costly electrodes used on the 10,500 feet of welding, dollar savings were appreciable.

Suitability of the Controlarc for Arcair gauging and cutting was another reason for the choice of this machine.

For better performance on *any* welding job, the Vickers Controlarc magnetic amplifier-rectifier DC Welder provides automatic control of *current* and *type* of arc adaptable to changes in welding conditions. For complete information on this unusual welding machine, write today for Bulletins EPD 7116-1.

expensive stub loss eliminated on stainless steel welding job

VICKERS INCORPORATED
DIVISION OF SPERRY RAND CORPORATION
ELECTRIC PRODUCTS DIVISION
1851 LOCUST STREET • SAINT LOUIS 3, MISSOURI

EPA 7110-1

JUNE
1958

Your

WeldWorld

at press time

Last minute news of interest to those engaged in joining and severing materials.

. . Common stock of Johnston & Funk Titanium Corp., Wooster, Ohio, has been acquired by Mallory-Sharon Metals Corp., Niles, Ohio. J&F is producer of titanium and zirconium wire and rod . . . also vacuum melted steel welding wire for special applications.

. . Stainless welding wire will be among products made by Detroit wire mill recently opened by Stainless Steel Div., Jones & Laughlin Steel Co.

. . Alcoa and Fairchild Engine & Airplane Corp. are testing highway bridges made of aluminum. If steel hike due this summer becomes reality, aluminum competitive position is greatly improved.

. . "Nicrotung," composed primarily of nickel, chromium and tungsten, is new super alloy developed by Westinghouse Electric Corp. High-temperature metal is designed for use in rocket and jet engines.

. . Stockholders have approved "Chemetron Corp." as new name for National Cylinder Gas Co. Former name will be perpetuated by National Cylinder Gas Division, which had been temporarily renamed NCG Div.

. . Handy & Harman lost gold valued at $35,000 in recent Chicago theft. Messenger's car was stolen outside post office where he had gone to make pick-up.

. . New guaranteed minimums announced for T-1 by U. S. Steel permit applications at greater design stresses. Yield is up from 90,000 to 100,000 psi; tensile is up from 105,0000 to 115,000 psi.

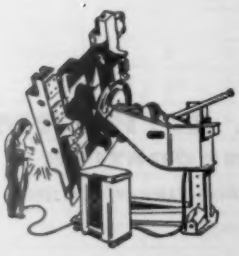
. . Big question in arc-welding electrode industry: how long will recently readjusted price schedule hold? Distributors feel it was not designed for them to live with very long.

. . Aluminum welding cable will become more competitive with copper if expected price drop brings it to copper level —or lower.

. . Steel production in mid-May was up to 48% of capacity. Further gains are predicted, as recent tonnage production hit highest peak since March.

. . Overseas report tells of British low-hydrogen electrode tipped with paste that forms shield as soon as arc is struck. Porosity, formed after starting but before coating begins to form shield, is thus overcome.

. . "Dynaweld" is new semiautomatic welding process introduced by Canadian Liquid Air (see story in this issue). System uses twisted welding wire that is coated in grooves.



. . Linde Co.'s distributors in North Dakota—at Fargo, Bismarck, Grand Forks and Minot—are now filling oxygen cylinders from one of Linde's mobile pumping units.

. . "Plate-Mate" is new line of welding electrodes introduced May 26 by Lukens Steel Co. Bow came one month earlier than anticipated. (See last month's WeldWorld page.)

the most complete stainless line in welding

- Well over 400 stainless electrodes to meet every known need for welding stainless or dissimilar metals
- All 3 types of electrode coatings—DC Titania, DC Lime and AC-DC Titania
- Choice of bare wire (straight cut, coiled or spooled), or coated electrodes.
- Continuing development program for formulating new Murex Stainless Electrodes to satisfy special engineering requirements

..backed up with a complete service package for the welding engineer

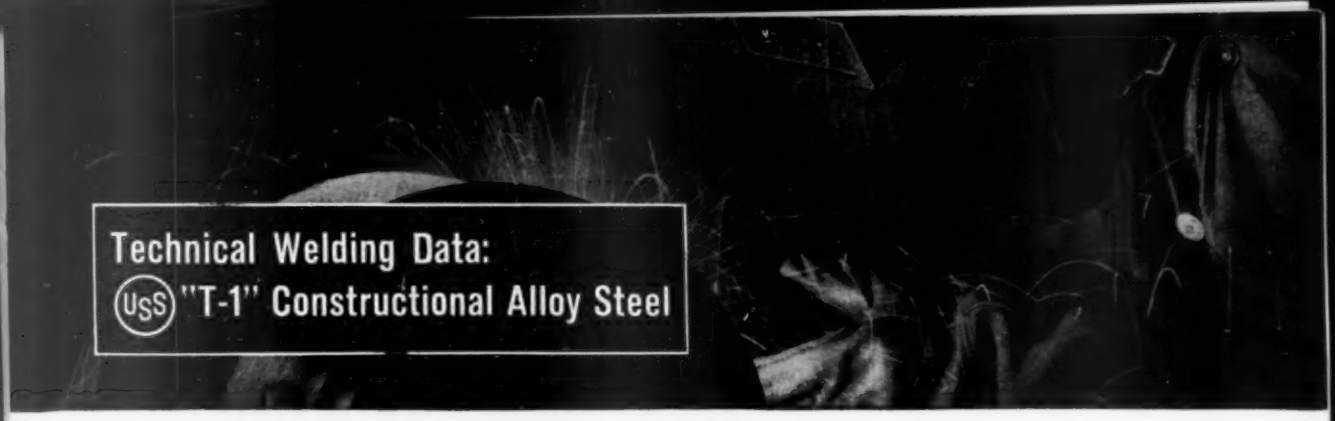
- Time-seasoned, weld-wise field representatives for personalized, on-the-spot service
- "Special Problems Staff" backing up our field representatives for assistance on unusual stainless applications
- Adequate stocks strategically located for ordering convenience
- Helpful, informative technical literature

NEW STAINLESS FACT FILE NOW AVAILABLE!

For reference material prepared to aid you in your stainless welding operations write for the MUREX Stainless Fact File just printed . . . If you have a specific problem we will be glad to help.

METAL & THERMIT CORPORATION

GENERAL OFFICES: RAHWAY, NEW JERSEY



Technical Welding Data:
USS "T-1" Constructional Alloy Steel

Control heat input when welding USS "T-1" Steel

USS "T-1" Steel is unlike many structural carbon and alloy steels—steels which require preheating before welding to ensure desirable microstructure in the heat-affected zone. Extensive experience over the years with fabricators of this constructional alloy steel has demonstrated that preheating is not generally necessary. Without it, either low carbon martensite or bainite is formed and these are microstructures of more than adequate toughness. With "T-1"* Steel, any process which tends to diminish the quenching capacity of the base metal, such as preheating or excessive heat input during welding, is likely to reduce the after-weld cooling rate so much as to form undesirable microstructures.

There are cases, however, when preheating is recommended. These may occur when welding involves one or more of the following factors: high restraint, moisture on the steel, electrodes not low enough in moisture content, and low-ductility weld metal. In the case of high restraint, for example, preheating can reduce the cooling rate of highly restrained, high-strength weld metal so that microfissuring does not develop. But it is essential to *control* heat input and preheat to within safe limits or loss of toughness in the heat-affected zone is likely.

The accompanying table suggests limits for heat input and preheat. These limits are based on published results of laboratory studies conducted at Rensselaer Polytechnic Institute using Charpy V-notch impact specimens of "T-1" Steel. In compiling the table, heat inputs were arbitrarily selected so that a toughness level of 10 ft-lbs at minus 50°F would be obtained. These heat input limits can be relaxed or made more restrictive whenever less or greater toughness is desired. Heat input, expressed as Watt-seconds/inch (Joules/inch) can be computed from a simple formula that relates current, voltage, and electrode travel speed.

$$\text{HEAT INPUT (Watt-seconds/inch) or (Joules/inch)} = \frac{\text{Amps x Arc Volts x 60}}{\text{Speed (Inches per min.)}}$$

Suggested maximum heat input for welding USS "T-1" Steel Values in Watt-seconds/inch

Preheat and Interpass Temperature	Plate Thickness						
	¼"	½"	¾"	1"	1¼"	1½"	2"
70°F	36 000	70,000	121,000	any	any	any	any
200°F	29,000	56,000	99,000	173,000	any	any	any
300°F	24,000	47,000	82,000	126,000	175,000	any	any
350°F	21,500	43,500	73,500	109,500	151,000	any	any
400°F	19,000	40,000	65,000	93,000	127,000	165,000	any

To illustrate the use of the table, assume that a multiple-pass buttweld is to be made in a ½-inch-thick plate and no preheating is to be done. The welding conditions selected for the first pass might be 220 amperes, 24 volts, and 5 inches per minute. Substituting these values in the formula, a heat input of 63,360 Watt-seconds/inch is obtained. This input would be tolerable since it is below the 70,000 maximum in the table. If by the time the next pass is to be made, the joint has cooled to ambient temperature, the same welding conditions could be used for subsequent passes. If, however, the joint were short and the welding heat accumulates in the plate to such an extent that the interpass temperature exceeds 200°F, the same conditions should not be used; either current or speed should be varied so that the heat input does not exceed the 56,000 Watt-seconds per inch shown in the table. The same precautions should be applied to all subsequent passes.

It will be noted that only in the relatively thin plates are the limits restrictive; in the thick plates, the limits present no hardship.

The values given in the table are applicable to manual metal-arc welding with a covered electrode and to automatic submerged-arc welding. Despite the use of a high current for automatic submerged-arc welding, the heat input is often less than that normal for manual welding owing to the greater speed of the automatic process. On the other hand, semi-automatic submerged-arc welding may have to be controlled more carefully because of lesser and non-uniform speed.

Write for complete information about the application and fabrication of USS* "T-1" Steel. United States Steel, Room 5604, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

*TRADEMARK

United States Steel Corporation – Pittsburgh
Columbia-Geneva Steel – San Francisco
Tennessee Coal & Iron – Fairfield, Alabama
United States Steel Supply – Steel Service Centers
United States Steel Export Company

United States Steel

Your quality-plus-economy team for heavy weld grinding

Abrasive: 44 ALUNDUM* Bond: B-11 Resinoid

Results: "Touch of Gold" Benefits

W-1857

In selecting weld grinding wheels, it pays to back an abrasive-and-bond team made up of proved winners. Take 44 ALUNDUM abrasive and the B-11 resinoid bond. This combination of Norton developments has been job-proved in plants throughout the country.

"44" grinds better than other non-premium priced aluminum oxide abrasives, cutting faster, cooler and lasting longer . . . because it's made differently, for extreme toughness and ruggedness.

The B-11 resinoid bond provides wheels more uniform in structure and better balanced. They "hug that work" closer, with less vibration and bounce . . . are precision duplicated, in half-grade increments evenly spaced across the entire hardness scale.

See your Norton Distributor for further facts on how this "Touch of Gold" team reduces operator fatigue and grinding costs. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

NORTON
ABRASIVES
Making better products . . . to make your products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — BEHR-MANNING DIVISION Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

$10,400 INVESTMENT SAVED $360,000 THE FIRST YEAR!

This dramatic example of cost reduction through X-ray inspection was recently documented in the industry. Astonishing... but only one of hundreds of cases where radiography has substantially cut costs.

X-ray inspection:

- Helps welders maintain uniform high quality.
- Permits use of thinner plates (permitted under ASME codes where welds are X-ray inspected).
- Guides development of new welding techniques.
- Eliminates need for trepanning.
- Permits rapid examination of inaccessible parts in assemblies.
- Ensures customer satisfaction by preventing product failures.

IMPORTANT NOTE:—Westinghouse radiographic equipment can cost as little as $8.83 per working day, including original investment (paid off in three years) and supplies.

Talk with your Westinghouse Industrial X-ray Specialist or write Westinghouse X-ray Department for information about the full line of portable, stationary and fluoroscopic radiographic equipment. J-08363

YOU CAN BE SURE...IF IT'S

Westinghouse

INDUSTRIAL X-RAY
Westinghouse Electric Corp.
X-RAY DEPARTMENT
2519 Wilkens Avenue
Baltimore 3, Maryland

They're wearing

Bay State abrasive engineer Don Kennedy put in enough years in the Navy to learn about rust removal and other grinding jobs the hard way. That's one reason why he's so useful to his customers and their operators . . . he knows what they're up against.

his "hat" wheels* and they wear well

When Bay State's now-famous "hat" wheels* were introduced at a large East Coast Shipyard, they caused something of a sensation. Here were revolutionary new grinding wheels that tore off metal like cup wheels but were much less heavy . . . that handled as easily as coated abrasive discs but cut faster, lasted longer and did more work at lower cost.

With today's increasing emphasis on welded construction, the outstanding performance of Bay State "hat" wheels is more important than ever. But prompt, intelligent service is important, too, and sales engineer Don Kennedy not only works with top supervisory personnel, he gets out on the job with the operators and really digs into their problems. Whether it's grinding welds on a super-tanker . . . smoothing up propeller castings for a new destroyer . . . or taking mill scale off a Texas Tower, his first-hand knowledge is backed by the most complete line of weld-grinding wheels on the market.

As a result, Don Kennedy's recommendations are practical and specific . . . Blue Flash for speed and heavy stock removal . . . Bayflex to resist loading on soft metals . . . Saf-T-Cut for longer life on hard, jagged surfaces . . . DuraCut for blending and finishing broad areas.

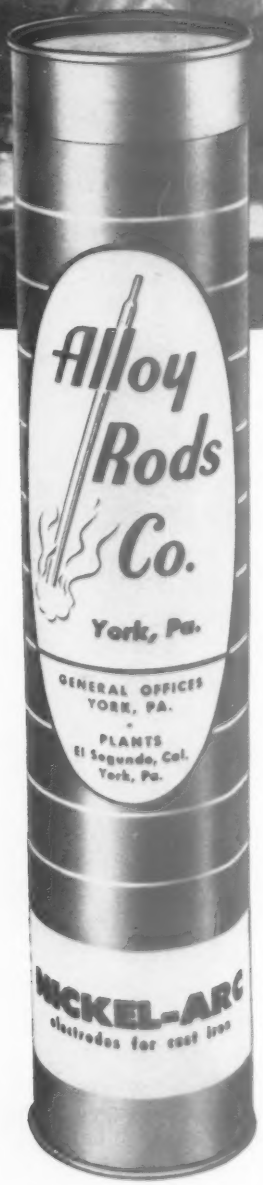
Whatever your company's grinding problems may be, you'll find Bay State representatives like Don Kennedy ready to help and competent to work out practical solutions.

**Raised hub disc wheels, reinforced for extra safety*

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Mass.
Branch Offices and Warehouses: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh.
Distributors: All principal cities. Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario.



Weld cast iron quickly, easily, permanently...with

IMPROVED NICKEL-ARC

A great favorite made better . . . Now the improved Nickel-Arc electrode provides the *ideal* for welding cast iron. An improved coating formulation coupled with the same popular core wire is the answer.

Better machinability . . . Always a popular feature with the Nickel-Arc electrode, machinability has been made even better. Both weld metal and fusion zone are well within the machinable range.

Crack free welds . . . Not only single pass overlays or repairs—even multiple pass fillets and butt welds, and in complex assemblies too, Nickel-Arc welds are crack free.

Easier to use . . . The stable arc of improved Nickel-Arc deposits beads smoothly, easily, into strong, porosity free welds of excellent color match. Works well in all positions on AC or reverse polarity DC.

Get the facts . . . on improved Nickel-Arc electrodes. Your Distributor or Alloy Rods Representative has complete technical data or write for a copy of Bulletin AR-2. Alloy Rods Company, P. O. Box 1828, York 2, Penna.

Alloy Rods Company

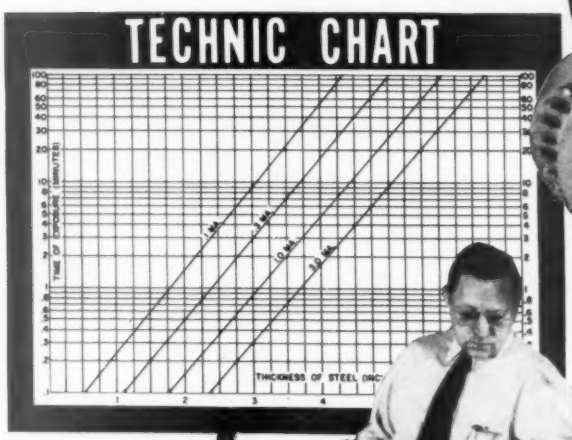
YORK, PENNSYLVANIA • EL SEGUNDO, CALIFORNIA

NO FINER ELECTRODES MADE . . . ANYWHERE

General Electric **x-ray** in industry

Million-volt x-ray inspection

...now up to 50% faster



G-E Resotron® 1000 with new emission control delivers more usable radiation, greater penetration for non-destructive inspection

THE CHART above tells the story. Of a new milestone in super-voltage radiography. Of remarkable new speed that makes 100% inspection more economical than ever for mass-production quality control.

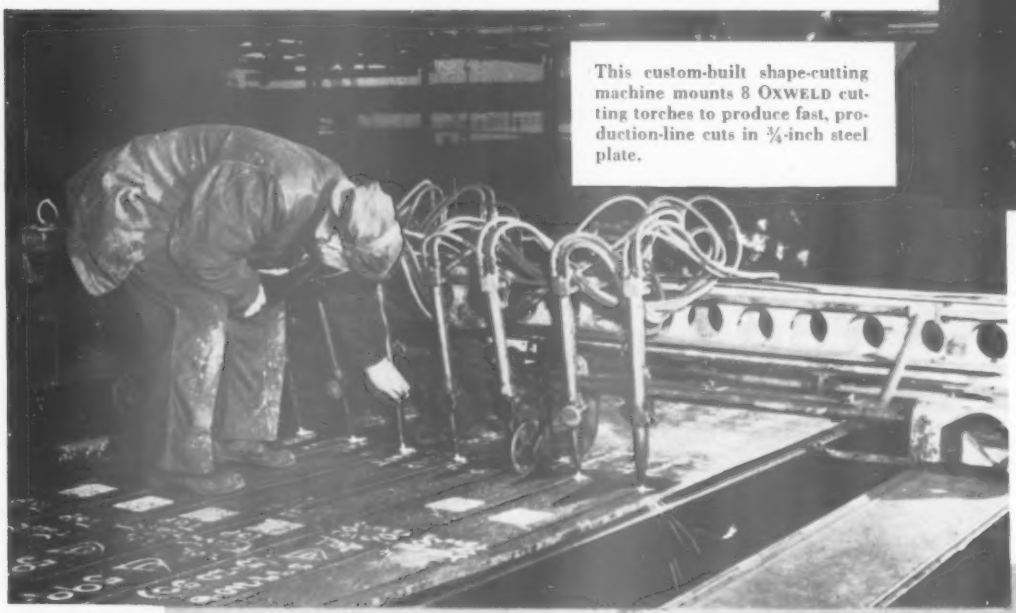
It's all in a new emission control circuit that permits operation at higher peak current. Exposure time is reduced 35% on the average . . . up to 50% for thick sections. This with all the radiographic detail and contrast . . . with the ease of preparation that sets the Resotron 1000 apart.

Ever heard the *full* story of what x-ray has accomplished in non-destructive testing? We'll be happy to cite cases — add more information on General Electric's complete line of x-ray apparatus. Included are units from 140 thousand to two million volts . . . for manual, semi-automatic or automatic operation . . . fixed or mobile. Ask your G-E x-ray representative for the new folder, "X-Ray in Industry." Or write X-Ray Department, General Electric Company, Milwaukee 1, Wisconsin, for Pub. AE-64.

Progress Is Our Most Important Product

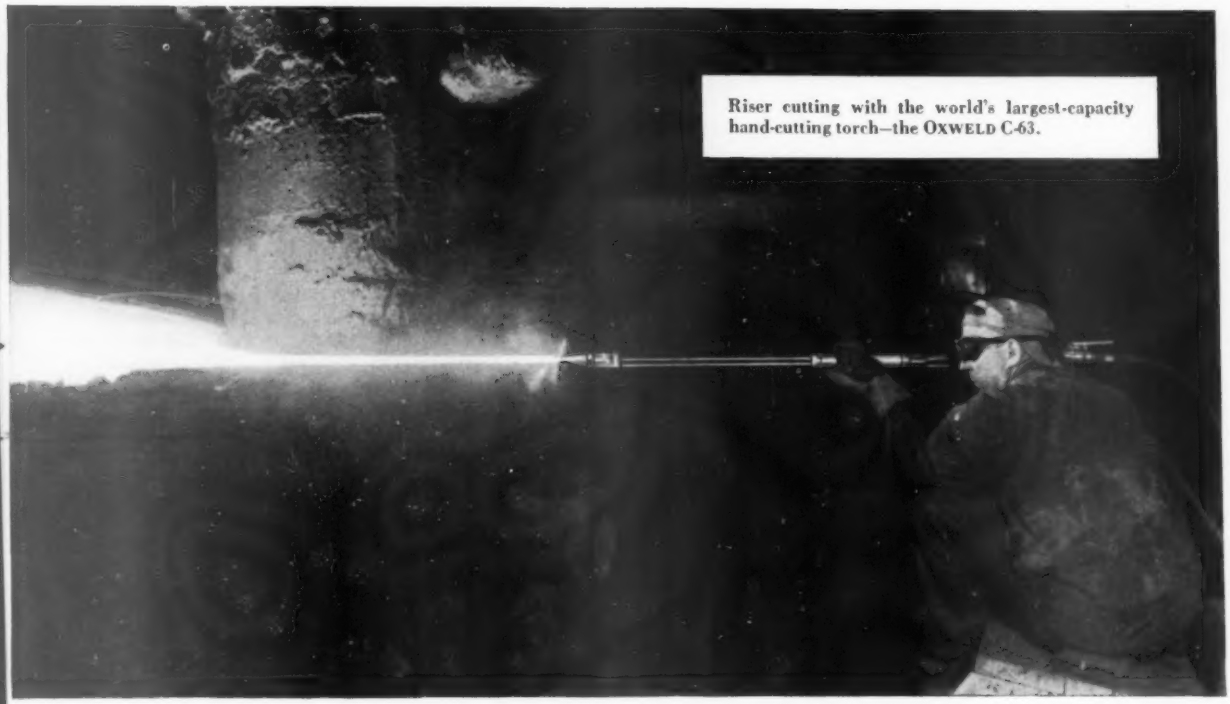
GENERAL ELECTRIC

NOW Oxweld TRADE-MARK CUTTING TORCHES...



This custom-built shape-cutting machine mounts 8 OXWELD cutting torches to produce fast, production-line cuts in ¾-inch steel plate.

A full selection of precision-made OXWELD nozzles assures maximum usefulness for every cutting torch.



Riser cutting with the world's largest-capacity hand-cutting torch—the OXWELD C-63.

...for every fuel gas combination

★ OXY-ACETYLENE ★ OXY-PROPANE ★ OXY-NATURAL GAS

Hand-cutting, shape-cutting, scarfing, powder-cutting . . . you name the cutting job! And pick the fuel gas combination, too . . . oxy-acetylene, oxy-propane, oxy-natural gas. Whatever your flame-cutting requirements, there's a complete line of dependable OXWELD torches to meet them exactly.

You can choose from the widest selection of top quality torches and nozzles ever made available—a choice that assures you of genuine OXWELD performance on every cutting job. Backed by half a century of know-how, OXWELD cutting torches and OXWELD nozzles are designed and built to give you trouble-free service, one hot job after another, year in year out.

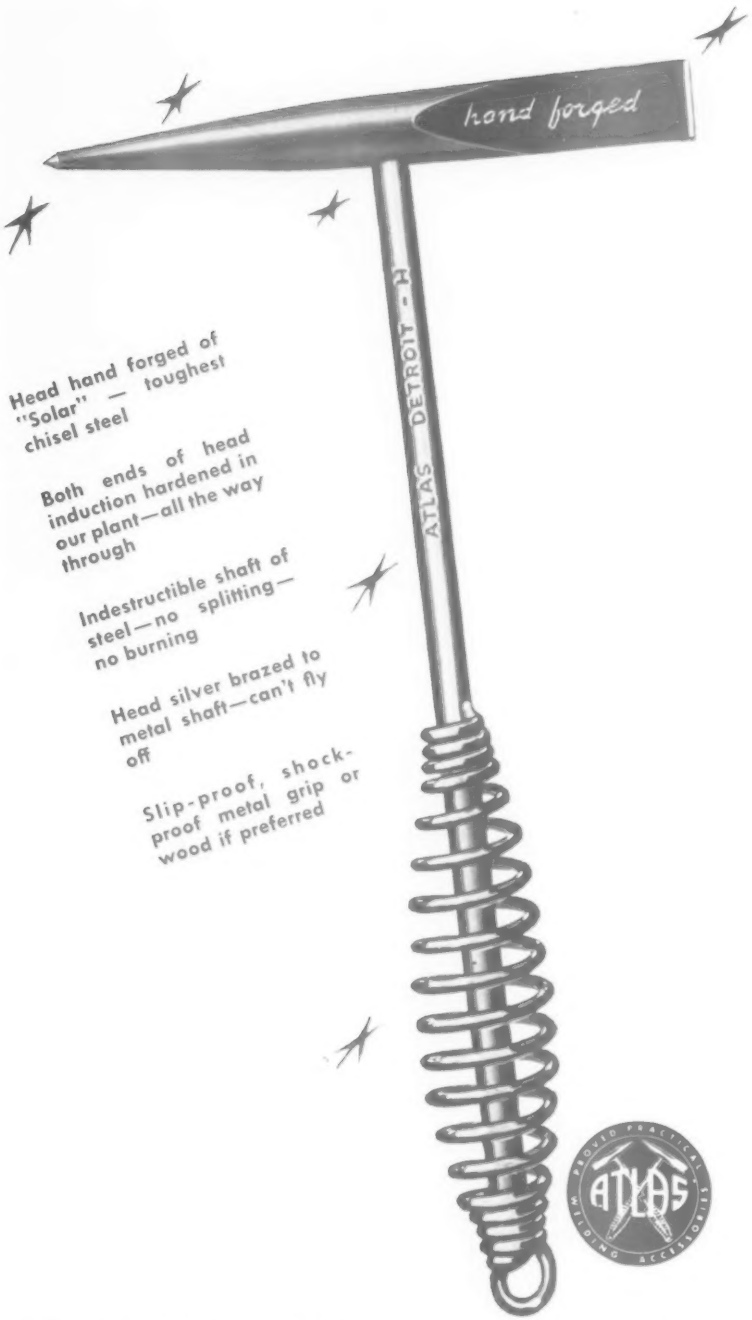
Ask your nearby LINDE representative to *prove* OXWELD performance to you today. He'll be glad to study your flame-cutting program and demonstrate how OXWELD cutting torches can help you save. Also write for free booklet, F-1174. LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. *In Canada:* Linde Company, Division of Union Carbide Canada Limited, Toronto.

Look to LINDE . . . for the Best in Welding and Cutting Apparatus

Linde
TRADE-MARK

UNION CARBIDE

"Linde," "Oxweld," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.


hand forged
ATLAS DETROIT - M
Head hand forged of "Solar" — toughest chisel steel
Both ends of head induction hardened in our plant—all the way through
Indestructible shaft of steel—no splitting—no burning
Head silver brazed to metal shaft—can't fly off
Slip-proof, shock-proof metal grip or wood if preferred
ATLAS
PROVED PRACTICAL
WELDING ACCESSORIES

YOU CAN'T BEAT ATLAS TOMAHAWKS FOR QUALITY!

Ask your welding supply dealer to show you the Atlas line of weld cleaning tools. Whatever the nature of your job there's an Atlas tool designed for it. Welders like them, their balance and feel and get better production with them.

ATLAS WELDING ACCESSORIES INC.
707 E. LEWISTON AVENUE, FERNDALE 20 (DETROIT) MICH

Letters should be addressed to: The Editor, WELDING ENGINEER, P. O. Box 28, Morton Grove, Ill. No letter will be published unless signed, but your name will be withheld if requested.

Welded boat

Sir: *New York City*

As a weldor of sorts for 20-odd years, and a sailor (also of sorts) for even longer, I read with considerable interest Mr. Foerste's article entitled, "Welded Yawl Cops Cups." *(April, p. 42)*

Mr. Foerste is obviously not a sailor, but in spite of that has done a very commendable job in describing the "Dyna" for the point of view of a sea-going man.

However, there is something which should be corrected in any future articles on welded boats. This is the frequently-made mistake of speaking of the speed of sea-going craft as "knots per hour." The word "knot" as applied to the speed of a boat or an airplane means "nautical mile per hour." Hence, it is complete in itself. If you use the words "knots per hour" you are speaking of acceleration, rather than speed.

Edward H. Roper,
Air Reduction Sales Co.

—Mr. Foerste, who clings to dry ground with unequalled tenacity, shamefacedly admits he was knot correct in this matter.

FEW and the future

Sir: *Marquette, Mich.*

May I take this opportunity to say how much I enjoy your excellent magazine.

I am especially interested in your March editorial "FEW and the future" and would appreciate further information on the Foundation for Education in Welding and its brochure "Modern Welding Practices" to pass on to my students.

I too feel the future of welding is in the education of our youth in welding. That is why for the past two years I have owned and operated the Pipe-Weld School of Welding here in Marquette, where I offer classes in both arc and oxyacetylene welding. The school is licensed by the Michigan State Board of Education under the supervision of

WORLD'S FINEST DC WELDERS

miller

MODEL
S R H

Only 30¼" high, the new Gold Star SRH combines compactness with the sensational improvements introduced by the Miller Gold Star line. These include wholly new transformers, completely sealed semimetallic rectifiers and weld stabilized circuits. Where stacking or paralleling adaptability plus the finest dc performance ever achieved is indicated, the Gold Star SRH is the unequaled answer. Available in three models with 60% duty cycle ratings of 200, 300 and 400 amperes.

MODEL
S R

GOLD STAR
DC-SR

The best welding current **ever** produced is delivered here. You **get** maximum arc stability for sounder, denser welds with **all** electrodes in **all** positions. And you get more of them in less time! This revolutionary performance coming from a machine of record-breaking dependability (see January welding magazines), has led industry and individuals to say of the Miller Gold Star SR-DC: "The SR gives **perfect** dc welding current; Easiest arc starting — bar none; Smoothest arc I ever used, and quiet to boot."

Available in both duplex and single models with ampere range from 200 to 1200. Complete complement of control equipment gives the Gold Star SR unlimited flexibility, plus milestone performance and unmatched dependability.

miller Electric Manufacturing Company, Inc. APPLETON, WISCONSIN

EXPORT OFFICE: 250 East 57th St., New York 19, N.Y. • Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal

Ranite offers FREE –

a systemized way to check wear on non-lubed parts !

Reduce maintenance costs and save on replacement of non-lubed parts with this easy, systemized way to check wear.

1. Use FREE Ran-Check-Charts to provide a complete picture of required maintenance on *all* your equipment.
2. Use FREE Ran-Check-Chart Stickers—like the familiar lube stickers—to provide on-the-equipment reminders of needed service.
3. Use Ranite Job-Graded, Color-Coded hardsurface welding rods to answer all surface wear problems.

Ask your Ranite distributor for your Ran-Check-Charts and Stickers TODAY . . . No cost or obligation!

RANKIN MANUFACTURING CO.
616 S. Marengo Ave., P. O. Box No. 631, Alhambra, Calif.

Ranite
HARDSURFACING RODS

the Department of Public Instruction and will be approved for G.I. training in May of this year. I have kept the school on an evening class schedule but am now enrolling students for day classes.

Please enter my subscription for a three-year renewal of WELDING ENGINEER.

L. J. Lytikainen

Master weldor

Sir: *Liberty, Ind.*

In reply to a letter in the December issue *(p. 18)* inquiring about a Master Weldor certificate and welding two butts at the same time, I would like to enlighten Mr. Schmidtmann and other readers.

In 1938 a few fellows got together with an attorney in Pittsburgh to try to organize a "Master Weldor's Association." The first meeting was scheduled for the attorney's office, but some 300 weldors turned up and a hall was rented. After several meetings at which we discussed qualifications and collected an initiation fee of $5, the attorney was sent to Washington to apply for a franchise, or whatever was required.

But Congress would not recognize a weldors union *because it was not a classified trade*, so we soon abandoned the idea. The only thing we had was a card which showed we had paid an initiation fee for the "Master Weldors of America."

. . . A few years ago I was employed by a large manufacturing company in Pittsburgh. We weldors would try to do different stunts, and I must say I became quite an expert at welding with both hands at the same time, and welding without looking at the bead. But in 1947 I attended a night course in welding metallurgy. I became aware of my stupidity and began to concentrate on the inner weld, that is, to visualize in my mind what was taking place in the molten puddle. I tried to run as steady an arc as possible and to produce the best possible weld. In order to do this I found it necessary to quit my stunts and even to use one hand to help my other hand from tiring, as I had learned in 1933.

I have also done away with carrying cards for the simple reason that I have worked all over this country, Alaska and other countries and found that a weldor must prove himself by his work, not by cards. I recently started a business . . . it is rough making ends meet . . . but each job is a new customer, one more convinced of what welding can do.

We should concentrate on the advancement of welding, not on the tricks that are possible with it.

Chuck Bayne
C. B. Welding & Construction Co.

A measurement of security

cannot be made solely with a steel tape. Radiography can help you get down deep, to penetrate where sight and touch can't go. Radiography can detect the flaw of a centerline bead crack . . . can sound the alarm against porosity or micro-shrinkage, detect incomplete penetration or lack of fusion. And radiography with Ansco Industrial X-ray Films can sound that alarm and *clearly* pin point the defect.

Ansco's superior separation of tonal values makes the difference! Flaws are uncovered more quickly, recorded more strikingly with the superb sensitivity of Ansco. Moreover, there is a particular Ansco Industrial X-ray Film for every inspection problem: Ansco Superay "A"—fast, fine grain film for most radiographic problems using either high or low voltages. Ansco Superay "B"—for highest contrast, somewhat slower in speed to record maximum definition. Ansco Superay "C"—for *rapid exposures* to make routine inspections. Ask for Ansco Films the next time you order and *see the difference!* Ansco, Binghamton, N. Y., A Division of General Aniline & Film Corporation.

Ansco

Industrial X-Ray

MANHATTAN MOLDISCS

Faster Cutting—Longer Life—Safer

Manhattan Moldiscs are custom-made to meet your grinding and cutting requirements . . . smoothing weldments, removing burrs, beveling edges on mild steels, stainless alloys, copper and aluminum. Tests prove they're the most economical portable wheels you can use on right angle grinders. That's because Manhattan Moldiscs keep cutting — right down to the last usable part of the wheel. Manhattan Moldiscs won't load or glaze . . . they cut cleanly and freely even on the toughest roughing and finishing jobs. They're *safer* to use, too . . . because they're light in weight, easy to handle, and reinforced with special super-strength synthetic fabric to prevent breakage on the job.

Manhattan Moldiscs are available in a range of types from harder, stiffer bonds for fast roughing to resilient bonds for fine finishing operations. Ask a Manhattan representative how you can get "More Use per Dollar" for *every* cutting or grinding job with Manhattan heavy duty abrasive wheels . . . Manhattan Moldiscs, Portable Wheels, Cut-Off Wheels and Centerless Wheels. Specify *Manhattan*, for faster, safer metal removal and longer wheel life.

RM 840

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Belts • Hose • Roll Coverings • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

BETWEEN PASSES

any old film?

X-ray film, that is. If so, it might be worth its weight in silver. Handy & Harman, New York City, will now process your old X-ray film as a refining lot and pay you full assay price of the silver recovered from it—less a re-

fining charge. At this writing, market price of silver was 90 cents per ounce (troy). Or, if you prefer, H & H will buy your old film outright, paying you on a per-pound basis. *(See page 62.)*

lotta frames

About 30% of all Chevrolet frames are produced in Granite City, Ill. This is the site of A. O. Smith Corp.'s one-product, one-customer plant. We were among several editors invited to a special preview trip through the plant on April 15. The following day, the Smith facility was open to a general tour planned by its management and local AWS members as part of the national convention program. (St. Louis and Granite City are only several miles apart.)

We found that about 2,700 frames are turned out daily by one and a half shifts . . . a ton of steel yields six frames . . . the plant uses about 450 tons of steel per day . . . all of it comes from the neighboring Granite City Steel Co. . . . this is about 10% of the steel firm's capacity . . . the frame plant normally employs about 800 weldors (out of a total force of 1,600) . . . all welding, with one minor exception of resistance, is by the manual-arc process, using E6012 electrodes . . . more than 2,000,000 Chevy frames have been produced since the plant opened in September, 1954.

nuclear aluminum

An aluminum alloy expected to help reduce cost of producing nuclear power has been developed by Argonne National Laboratory, Lemont, Ill. Designated X-8001, the experimental alloy will be used as protective cladding for fuel elements in Argonne's low-power reactor, now under construction in Idaho. The cladding was developed by adding small amounts of nickel to aluminum 1100—a commercial alloy containing iron. The addition made the alloy more resistant to corrosion by high-temperature water than commercial aluminums having iron as the primary alloy material. Present cladding materials, like zirconium, are many times more expensive than aluminum and are generally more difficult to process and fabricate. Alloy X-8001 resulted from several years' research by Dr. J. E. Draley, Westley E. Ruther, and other members of their Argonne group.

(Anent the nuclear age: *WE* will shortly present the first of a series designated to familiarize you with the basic principles of nuclear power.)

safety belt

A weldor at Falk Corp., Milwaukee, accustomed to working atop huge weldments, earned himself a little extra money recently via the firm's suggestion system. Realizing, he could do a better job with both hands free, Delbert Balkmann recommended use of a safety belt for men who welded high above the plant floor. The belts were tried, the suggestion adopted, and Balkmann was paid.

computer

An electronic computer is the newest approach in providing maximum service to Crucible Steel Co. customers. The Pittsburgh firm has incorporated information compiled by the electronic servant in a "Crucible Alloy Warehouse Stock List," which enables steel users to determine easily and quickly the immediate availability of alloy steel stocks by grades and sizes.

Principally used for inventory control, the computer assembles all stock data, then breaks it down into six specifically designated geographical areas. The stock list is slated for reprinting every three months. Planned for future publication are similar booklets for many of Crucible's other products.

did you miss us?

The editor of this page returns to his part-time duties as disseminator of "days," and "weeks" and "months" bulletins. Did you know that . . .

June is Portable Radio Month?

June 4 is Old Maid's Day?

June 14 is National Expectant Father's Day?

June 15-21 is National Bow Tie Week?

June 21-30 is National Mayonnaise and Salad Dressing Week?

You *didn't?*

the Bard

E. J. Clark's second "Shakespeare in the fabrication shop" contribution (below) reminds us that our July issue will have several special maintenance articles.

. . . mechanic slaves, with greasy aprons, rules and hammers

Antony & Cleopatra, Act V, Sc. 2

Weldynamics

ARC WELDING AT WORK CUTTING COSTS

Weld questionable steels with . . .

JETWELD LH-70

- *Outstanding overhead and out-of-position operation*
- *High physical properties*
- *Fast, easy iron powder action*

Jetweld LH-70 operates overhead with the smooth, fast action—and has the high physical properties of a low hydrogen rod.

Produces crack-free welds on heavy plate with a minimum of stress relieving. Reduces the need for preheat on medium carbon steels—makes porosity free welds on sulphur bearing steel.

A.W.S. Classification E-6016.

Look for the three dots • • • symbol of Lincoln quality. Weldirectory of Lincoln mild steel electrodes Bulletin 7000.1 sent free on request.

The World's Largest Manufacturer of Arc Welding Equipment

LINCOLN®

© 1958 The Lincoln Electric Company

THE LINCOLN ELECTRIC COMPANY, DEPT. 1742, CLEVELAND 17, OHIO

JUNE, 1958

Welding Engineer

ESTABLISHED 1916

Hanged by mistake!

"HANGED BY MISTAKE"—this is inscribed on a weather-beaten, wooden cross marking a grave in Boot Hill, Tombstone, Arizona, the burying ground of the West's badmen.

This ironic statement may have cleared the records as far as the executioners were concerned, but the victim of the error remains irrevocably dead.

Although such mistakes were not *too* common in winning the West, they make their appearance more often than necessary in modern fabrication problems. And welding is usually the victim of the "hanging."

Having just returned from a business trip to Miami, we are happy to report welding is playing an important part in many construction jobs underway there. (We are sure many, like ourselves, are hoping for lower room rates as a result of cost savings to those hotels making use of welded structures.)

One Miami construction job had some good examples of how welding could be "hanged by mistake(s)." The major error on the job—a composite construction, partly reinforced concrete and partly welded—was one of column alignment.

The steel erector claimed the huge H-columns projecting from the reinforced concrete were from ½ to 1½ in. out of line. As a result, bearing plates had to be welded to these stubs for proper bearing from the load carrying columns above the joint.

THERE WERE OTHER mistakes which only welding could correct. But when more welding than necessary is used, higher than necessary costs are inevitable. This in turn reflects badly on welding, and the improper conclusion usually is that welding is too expensive.

Ironically, even though welding might "hang" for its work in this particular job, it would have been a more difficult, if not impossible, job to correct without welding. If other means of joining had been considered first, welding would have been called in eventually.

But it will be surprising if welding is credited with saving the job rather than being penalized when the final cost figures are tallied.

THESE "HANGING OFFENSES" against welding are not only confined to the construction field. Sheet metal products for the home are now being joined by spot welding, but the welds are failing and cutting short the product's service life.

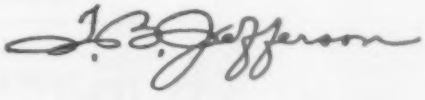
The failures, of course, act as fuel for those claiming "welding is no good." Actually the cause of failure is defective welding practice rather than defective welds.

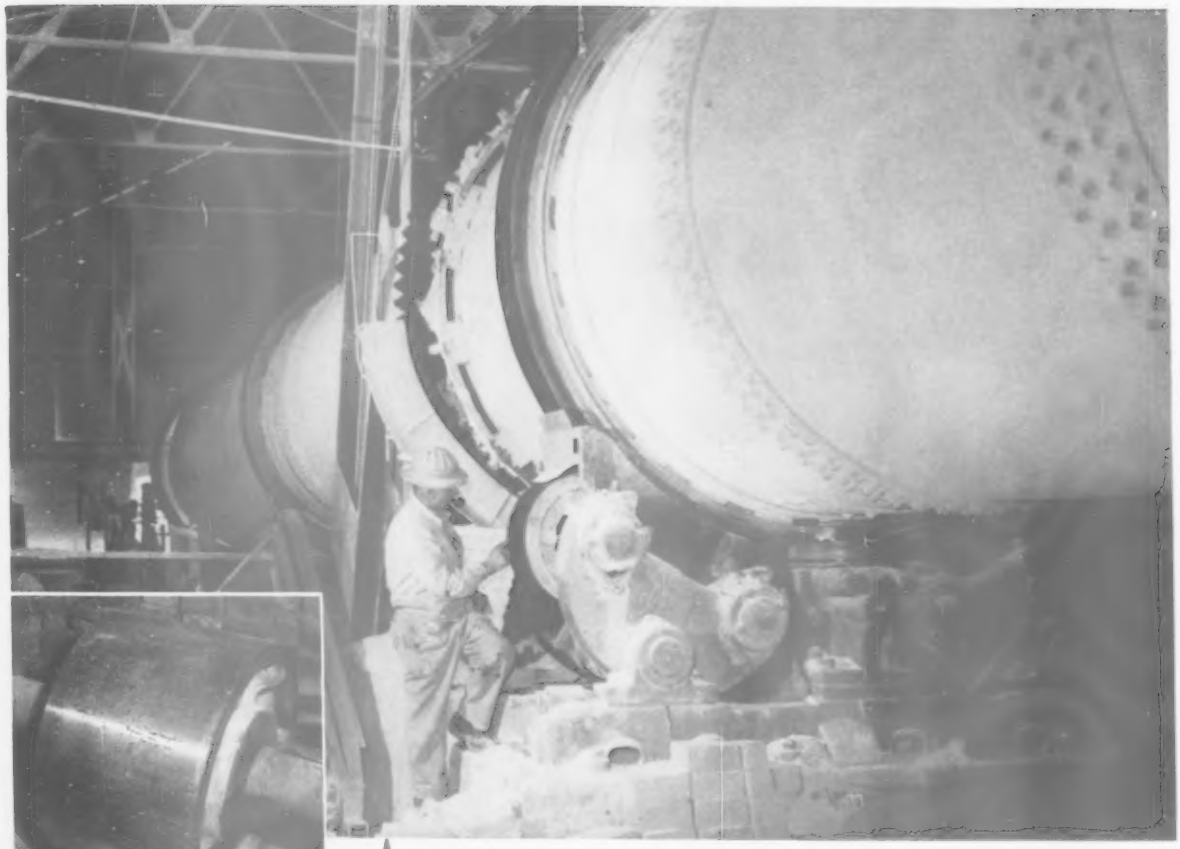
Many of these manufacturers still have no idea of the importance of welding current time. To them the sole indication of a good spot weld is the number of sparks flying during welding operations. Whether the metal is being fused or burned makes no difference—so long as that beautiful shower of sparks is there.

This mistake in judgment, that is, giving no thought to precisely timing the flow of welding current, penalizes the welding process. The actual blame should be laid at the door of manufacturing inefficiency.

Let's not "hang welding by mistake." Be sure that the process and procedures are correct from a production standpoint, and that design is proper from the engineering standpoint.

In this way a welded product will become synonymous with greater strength, lighter weight, more pleasing appearance and less cost.





View showing relative size and position of furnace, rolls and rings.

Roll hardfaced with Victoralloy No. 1. After ten months of constant operation, no wear, flaking, or cracking of edges.

A case of wear and tear... and how Victoralloy solved it

PROBLEM:

The 300-ton furnace of Diamond Springs Lime Company, Diamond Springs, Calif., rolls on 16 centered 30/40 carbon steel rolls. The furnace's heavy weight and terrific heat caused the rolls to flake and crack at the edges. This in turn caused the furnace roller-rings to begin disintegrating. How to stop the wear and tear before an expensive shutdown and complete replacement of rolls and roller-rings became necessary?

SOLUTION:

Herbert Green, superintendent, and John Desson, general foreman, hardfaced the rolls with Victoralloy No. 1 Coated-Electric. Checking after ten months of operation, they found the case solved: no flaking of rolls, no cracking at the edges, and no disintegration of furnace roller-rings.

You, too, can solve cases of wear and tear on operating parts with Victor hardfacing alloys. Complete line of 26 different alloy rods assure you a right rod for every hardfacing need. Full range of sizes for both acetylene and electric AC and DC applications, either hand or automatic. Order from your Victor dealer TODAY.

• FREE •

Victor Hardfacing Manual shows you right rod to use and how to apply it. Write us NOW *for your copy.*

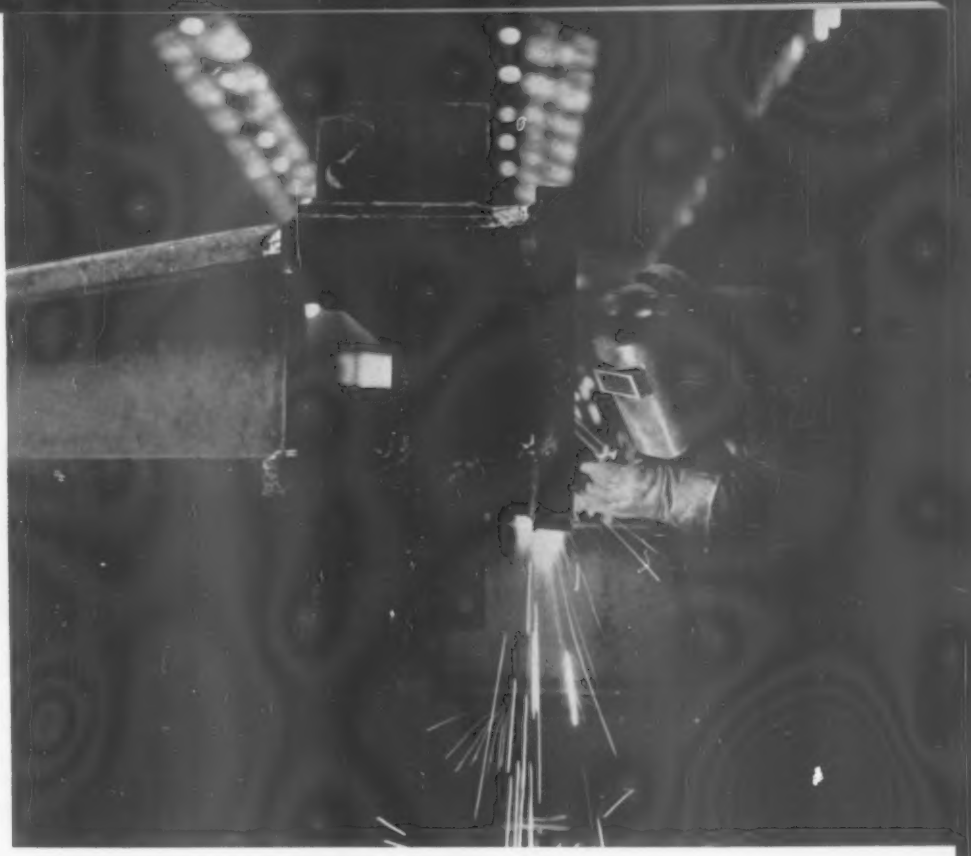
Profitable dealerships open; inquire now!

H-40 **VICTOR EQUIPMENT COMPANY**

ALLOY ROD AND METAL DIVISION

13808 E. Imperial Highway, Norwalk, Calif. • Wakita, Oklahoma

Welding Engineer



Ranging the welding world

from pole to pole in search of news,

Welding Engineer discovers

many unusual jobs—

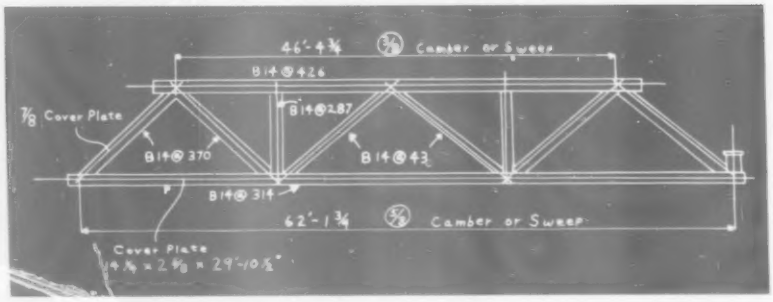
unearths hundreds of welding hints.

For a passport to this exciting world,

turn the page...

Welded trusses to support newest NYC skyscraper

Welding was specified for this job because resultant weight savings contributed to ease of handling. Consequently, the trusses could be handled as units instead of in sections



SOME indication of the enormous weight of these welded trusses fabricated by Bethlehem Steel Co. can be seen in the above drawing. Some beams weigh as much as 426 lb. per foot.

By F. T. Tancula

FIVE OF THE LARGEST welded trusses ever fabricated for building construction will help support the new Time & Life Building, soon to be erected in New York City.

Bethlehem Steel Co., which recently built the trusses in its Bethlehem, Pa., weldment shop, believes they may be the first of their size to be completely welded. A spokesman for the firm said:

"We consider these trusses to be unusual. After studies had been made of similar riveted and bolted designs by the design engineers, Edwards & Hjorth, New York City, it was found that welding could furnish the lightest truss—light enough to be erected as one piece instead of several units." Architects for the structure are Harrison, Abramovitz & Harris, New York City.

Four of the trusses weigh approximately 45 tons each and measure 62 ft 1¾ in. along the longest—bottom—chord. The fifth weighs about 19 tons and is 43 ft 7 in. long at its bottom chord.

These trusses will help carry a nine-floor load of the new 48-story

BEAM for smallest of five trusses is properly sized by flame-cutting. Weighing 264 lb/ft, it has a width of 16 in., depth of 16½ in. with a flange thickness of 1 15/16 in.

WORKERS use layout plan on floor plate to aid them in fitting-up a vertical post to the lower chord of one truss prior to welding.

PHOTOS shows tractor-mounted submerged-arc unit in use on large truss. In photo at right, area between dotted lines is heavy stub column capped with 5½-in.-thick base plate, one of the column's bearing surfaces.

Manhattan tower. Their installation eliminates nine columns in the third cellar of the structure, leaving a wider area open than would otherwise be possible for vehicular traffic.

Main structural members of the large weldments are Bethlehem wide-flange beams of ASTM-A373 steel, a carbon steel especially suited for welding fabrication. Chord beams range in web flange thickness from ⅞ in. to 3 in.

With exceptions to be noted below, all joints were fully welded by the automatic submerged-arc process.

During welding operations, all components were kept at 200 F, the temperature they were brought to in a preheat operation with oxy-natural gas torches.

First welding step was joining the cover plates, averaging about 2⅝ in. thick, to the flanges of bottom chord members on all trusses. Similar reinforcing plates were also welded to web members of top and bottom beams, and two diagonal members at either end were stiffened with ⅞-in. flange cover plates.

Weld operations were on a round-the-clock basis to keep temperature near constant. Localized heat was applied where needed if cooling occurred.

To prevent distortion, welding was alternately performed on either flange of each beam. The first fillet pass was laid along the length of the cover plates; the beam was turned and similar plates were joined to the opposite flange.

Two 2⅝-in. plates, each approximately 30 ft long, were needed to reinforce the 62-ft bottom chord. Cover plates for the top chord were one piece, 14¾ in. wide by 2½ in. thick by 46 ft 3 in. long. Two passes for each fillet were needed to complete the joint.

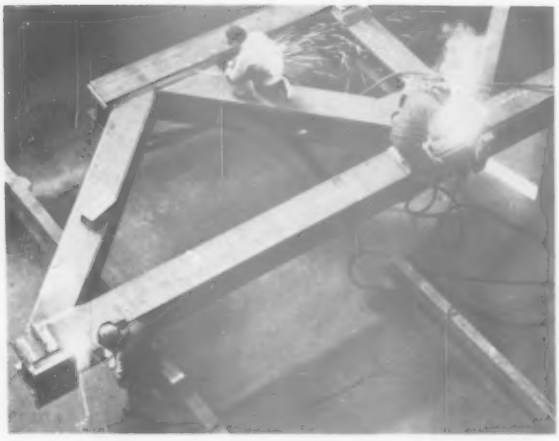
In joining reinforcement plates to flanges, two passes were made for each fillet joint at a welding speed of 6 ipm. An a-c transformer welder supplied current of 550-700 amp at 36 volts. Filler was a 3/16-in. mild-steel welding wire.

After cover plates were welded to beams, the members were straightened in a 6,000-ton press.

Beams, vertical posts and diagonals were then assembled on their sides for downhand welding. All welds were flange to flange. Backing strips

LEFT: Worker uses pneumatic chipper to scale slag from weld joining diagonal segment *(left)* to upper chord member *(right)*. Former weighs 370 lb/ft and has 11/16-in. cover plates. Upper chord member weighs 426 lb/ft, has 3-in.-thick flanges, and, with 2½-in.-thick cover plates welded top and bottom, has a depth of approximately 23¾ in.

RUN-OUT tabs are flushed off with a scarfing torch.



FULLY submerged-arc welded, this truss is being completed by a weldor, a grinder and a scarfing torch operator. Weldor *(right)* is working on one of six T-connections used on the truss for transverse bracing. Torch operator *(left)* is removing run-out tabs which aided starting and stopping of submerged-arc welders on long seams. Grinder goes over scarfed areas in touch-up operation.

RIGHT: One truss is already loaded on flatcar, ready for its short trip to machine shop, while a second receives finishing touches. Both are 62 ft long, and weigh 45 tons each.

and tie bars, manually welded with E6012 or 6013 electrodes, using a-c, helped in fit-up and in fabrication.

Backing strips were first tack welded, then completely finish welded (also manually) after all passes were laid in the joint. Tie bars were cut off after the first pass was made on either side of the weld to prevent diagonals and chord members from restraining the joint.

In this flange-to-flange welding, the backing strip was 2½ in. wide by ½ in. thick. Two manual beads were laid in the 15-deg included angle as a root pass preparatory to multi-pass automatic welding. In effect each manual-arc weld joined the width of each flange to the back-up strip, since there was a slight gap in fit-up.

"When it comes to inert welding . . . this guy's tops!"

As in the cover plate-to-flange welding operations, power source for the submerged-arc welds joining diagonals and posts to chord members was a-c transformer. Filler wire and current settings were also identical. Welding speed on the numerous passes (up to 25) needed to join flanges varied from 8 to 10 ipm.

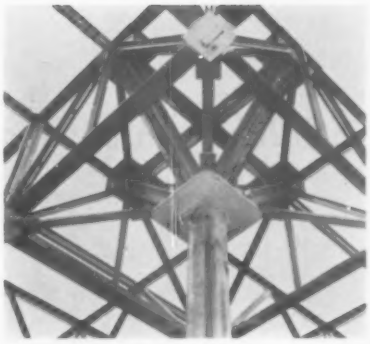
The pads on which building columns will rest were also automatically welded to each truss. After leaving the weldment shop, these bearing surfaces were drilled and faced in Bethlehem's machine shop.

Before being shipped to the Manhattan building site, heavy steel tabs used as aids in lifting and turning the trusses were removed by flame-cutting.

Bethlehem spokesmen estimated the automatic welding time consumed in fabricating each of the four larger trusses at 200 man-hours. The amount of weld metal was further estimated at 1,250 lb per large truss.

The four larger trusses for the new skyscraper, at 51st and 52nd Sts. at 6th Ave. (Avenue of the Americans), will carry two interior columns each, while the smaller truss will carry only one. Upper column loads will be 2,438,000 lb (1,219 tons) per 62-ft truss. The single column load on the 19-ton truss will be 670 tons.

Some load, all right, but these weldments will be more than able to carry it!



ONE of 16 steel columns with the grid roof in place. Stainless steel ball and socket atop each column allows for deflections of roof under various loads.

At the new Colorado Air Force Academy

Welding helps raise the roof

TWENTY-SEVEN WELDORS, more than 12 tons of welding electrodes and 3 months of intense work—put them all together and you've got the world's largest welded grid roof.

Measuring a block square, the 1,150-ton steel truss was built by U. S. Steel's American Bridge Div., and forms the roof of the new cadet dining hall at the Air Force Academy site, Colorado Springs, Colo.

Electric arc welding played an important role in the construction of this unusual grid roof, which was fabricated on the ground and then raised 24 ft by an intricate and precise hydraulic jack system.

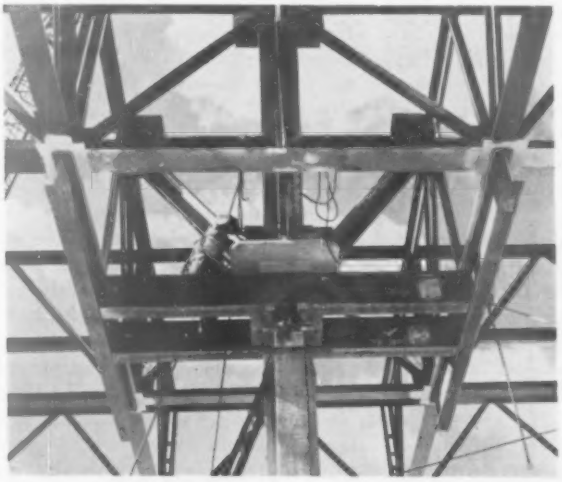
While still on the drawing boards, it was obvious that the weight of the steel truss roof, plus its 266-ft unsupported span, were going to be problems. The solution: welding.

Overall weight of the roof was reduced 15% by welding, U. S. Steel reports, because smaller trusses were used and the usual fittings were eliminated.

The firm's engineers determined there would be a 1/16 in. shrinkage at each joint or ⅛-in. for each 14 ft of the 308-sq ft truss. This was solved by establishing two base lines crossing each other at the exact center of the structure. All measurements were made from this center base line with an allowance of ⅛-in. for each 14 ft truss as it was welded in place.

To check weld quality, Air Force inspectors radiographed 10% of the 4,000 different welds needed for the steel truss. Only one portion of one weld was below the high construction standards set for the roof, the firm reports.

WELDED grid roof starts its 24-ft rise through use of hydraulic jacks. More than 4,000 joints of this 1,150-ton steel truss roof were are welded.



STEEL truss is welded to a 9-ton supporting column. Under the weldor is a temporary steel frame, one of 24 used to lift the roof in place.

The 308-sq ft roof frame was assembled on a temporary support 2½ ft high. Sixteen steel columns, weighing nine tons each, were set in place to carry the roof after it was jacked into position.

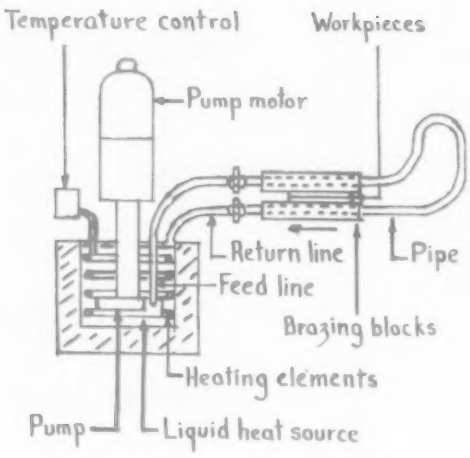
The 266-ft unsupported span of the roof made this procedure necessary, says Lewis Hack, erection superintendent. Assembling and welding the trusses in their final position would have required erecting a great deal of temporary falsework.

A stainless steel ball and socket on the top of each column support the roof. The entire roof rests on 6-in. diameter hemispheres, which act as hinges for the deflections of the roof under various loads.

In September, when the cadets move to their permanent academy site near Colorado Springs, the hall will be ready for them. It will boast a stainless steel ceiling and over 94,000 sq ft of virtually unobstructed floor space. Architects for the project were Skidmore, Owings and Merrill.

for aluminum or magnesium . . .

New process features close control of brazing heat



SCHEMATIC diagram shows all major features of "Thermoduction" unit for brazing aluminum or magnesium.

HIGH-TEMPERATURE brazing of aluminum and magnesium has been a problem for years because brazing alloy melting point is very close to that of the parent metal. Aluminum and magnesium alloys melt at approximately 1,200 F.

Because of cost factors . . . because the alloys don't show a color change at brazing temperature . . . because of heating unit size . . . or because of a lack of temperature uniformity in the brazed area, induction heating, furnace and torch brazing methods have been somewhat unsuccessful on aluminum and magnesium brazing jobs.

New Rochelle Tool Corp., however, is doing the job with relative ease.

New Heat Source

The New York firm has developed a new type of heat source for metal-brazing jobs in which close temperature control is required. It terms the method "Thermoduction".

Basically, "Thermoduction" consists in pumping heated liquids through metal dies designed for a particular application. The dies contact work being brazed. New Rochelle Tool reports that it combines these important factors (*1*) accurate temperature control (+ or — 5 F), and (*2*) high rates of power input to work being brazed.

Heat source is a fully-insulated, electrically-heated tank. Temperature of liquid in the tank is held to a close pre-set value: typical working temperature for aluminum would be 1,170 F (+ or — 5 F). Conventional thermocouple instruments control electric power input to achieve this accuracy in liquid temperature.

High Energy Rate

Mounted in the tank of liquid (which shows a dull red heat) is a specially-built, water-cooled centrifugal pump which forces liquid out of the tank into stainless steel or other types of corrosion-resistant pipes which, in turn, carry it to blocks of Inconel. After passing through these blocks, the liquid returns again to the tank.

This liquid has a specific heat of 0.2 and a density of approximately 100 lb per cu ft. Flowing at a rate which can be varied from 5 to 50 gal per minute, it obviously brings a high rate of energy to the metal "Thermoductor" blocks and, from them, to the workpiece.

The good thermal conductivity of aluminum and magnesium assures an equally good transfer of heat from blocks to metal to brazing alloy. And close control of liquid temperature prevents overheating of parts.

In a typical lap-joint brazing operation, the joint is prepared in the usual way by coating it with brazing flux and placing a shim of alloy in place. Commercially available sheet with an alloy coating may also be used.

The workpieces are then placed between the two heated blocks—which, incidentally, can be shaped to suit contours of any object being brazed. Blocks are brought together with light pressure, and on 16-gage aluminum, for instance, brazing occurs in less than 30 seconds. When alloy has flowed, blocks are raised slightly and the work removed.

Chill Blocks

Work removal from the blocks can often be done while the alloy is still in the liquid state. In other cases, objects can only be removed after the alloy has solidified. The latter state can be accomplished through the use of a set of water-cooled chill blocks adjacent to the heating blocks.

These chill blocks are brought into contact with the work after the alloy begins to flow. With aluminum's high thermal conductivity, only a very small temperature drop is required to solidify the alloy. But whether the alloy is water cooled or not, the brazed part is allowed to cool to room

temperature, and flux is then removed by hot water washes or acid dips.

Not all types of aluminum and magnesium joints can be handled by the "Thermoduction" method, but New Rochelle Tool states that a large variety of conventional joints can easily and simply be brazed. Long straight lapped joints in sheet are cited as an excellent application.

"It is quite practical," a spokesman notes, "to make a ½-in.-wide lapped joint in aluminum sheet that is 50 ft long. The whole braze takes place in less than one minute. Naturally," he points out, "there would be multiple pumped heat sources along the 50-ft length of pipe supplying the heat blocks."

"Fairly Common"

Tube-to-sheet brazing is another fairly common joint type cited by the firm as applicable for its new method. As an example of such a brazing operation, envision the placement of a serpentined ⅜-in. tube upon an aluminum sheet 6 ft long and 2 ft wide.

Formed alloy shims are placed underneath the tube and the assembly is clamped between two large, flat heating blocks. One block contacts the sheet, the other covers the top of the tube. Such a brazing job could reportedly be done in approximately two minutes.

Circular lapped joints can be made by "Thermoduction" if the heating blocks are formed in two semi-circles. (Actually, joint shapes capable of being handled by the method are limited only by the ability to form a hollow block and bring it into reasonably intimate contact with the area to be brazed.)

New Rochelle Tool Corp.'s equipment is built "on the basic philosophy that there should be a general-purpose heat source which can be connected to operate a variety of specially-tooled blocks and fixtures," the company states.

Compact Unit

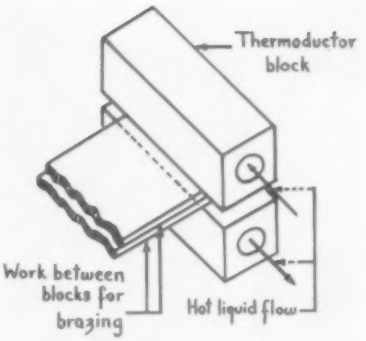
The liquid tank, pump, and some temperature-control equipment is housed in a single cabinet, on the side of which are two stainless pipe unions to which heating blocks and associated piping can be quickly attached. When switched on, the unit reaches proper temperature in less than a minute, and is ready for operation. All exposed, non-working pipe and block surfaces are insulated to reduce heat losses and to increase operator comfort.

Clamping power for the heating blocks may be either manual or air-operated with an automatic time control. In arranging the pressure devices, however, care must be taken to see that excess pressure does not extrude heated aluminum. Mechanical stops limiting block movement provide the easiest method of preventing such an occurrence.

Pressure applied to the brazed joint should be as low as possible—consistent with good heat transfer from block to workpiece. Usually, it is about 1 or 2 psi.

"Thermoduction" equipment can be built in sizes of 25 and 50 kw—and larger. Power rating of each represents maximum power entering the heat tank. Average power consumption, says the firm, is considerably less than the full rating "since thermal losses from the system are minimized by proper insulation".

Full power input is utilized during the start-up period, and when large quantities of heat are extracted from the brazing blocks.



HOLLOWED blocks carry heated liquid for transfer to workpieces. Parts to be brazed also are clamped lightly by blocks.

Smaller, Cheaper

New Rochelle Tool reports that its 50-kw unit costs "approximately one-fourth the price of an equivalent temperature controlled furnace and occupies a much smaller floor space". Exclusive of tooling, this unit would require an approximate 6-ft by 6-ft space.

The firm stresses the fact that brazes are performed at high speed, and that most are done in less than one minute. In many cases, multiple units can be brazed simultaneously.

And here is a list of further advantages claimed for "Thermoduction" by New Rochelle Tool Corp.:

»Selected heating ("if blocks can be designed to contact only the portion to be brazed").

»Slight pressure on joints ("thinning out the alloy to give a stronger joint than one in which alloy is considerably thicker").

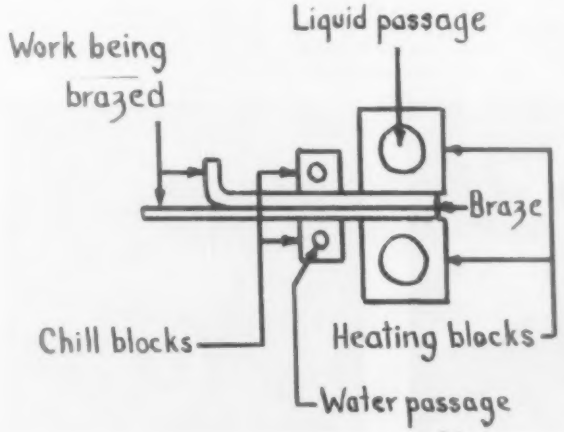
»Simplicity of operation ("requiring only unskilled labor to produce highly-complicated joints").

»Operating costs less than those for an equivalent furnace.

»Unit compactness ("enabling its placement in a production line as a complete entity, and without the need for an elaborate layout").

»Reduction of rejects ("since there is no possibility of overheating and damage to parent metal").

»Broad application area ("on any aluminum or magnesium alloy which can be brazed by conventional means — and requiring only conventional alloys and fluxes").



IF brazing alloy must be cooled before workpiece is removed from blocks, chill blocks can be used as shown at left to speed alloy solidification.

ABOVE: B-P welding technician Frank Cherry shows simple copper screen protecting operator from arc heat. BELOW: Operator Walter Fox sets up inch-thick steel flange for arc-air beveling operation.

MOVING at 30 ipm, torch blows compressed air at 90 psi on arc-heated metal to effect ½-in.-deep bevel.

At the Baker Perkins plant . . .

Arc-air for beveling cuts milling time 75%

By Jack Fairlie

MANUFACTURING COSTS are understandably high when the equipment being fabricated is slated for use in the food and chemical industries. These industries can subject their specially-built machines to conditions of wear that would quickly defeat less sturdy units.

With this fact in mind, it's no wonder that Baker Perkins, Inc., of Saginaw, Mich., looks to welding for the optimum in built-to-last equipment.

Reportedly the world's largest manufacturer of food and chemical industry equipment, B-P obviously didn't achieve this distinction without keeping a close eye on both quality and costs. An example of just how effective such a policy can be was uncovered in one corner of the welding shop.

Here, an arc-air gouging torch supplied by Arcair Co. of Lancaster, Ohio, is now in continual use beveling heavy steel parts for subsequent welding operations. But it wasn't always so. These same parts were once beveled by milling machines.

"Now that the arc-air torch is used on this job," notes B-P welding technician Frank Cherry, "we've managed to eliminate 75% of the milling work, and our savings in time and money have so far been estimated at about 50%."

Powered by a 600-amp d-c motor-generator set, the torch is fitted with a ½-in. carbon electrode. In its most common application—on 1-in.-thick steel flanges for chemical mixers—the arc-air unit is supplied with compressed air at about 90 psi.

In gouging a ½-in. bevel in this part, the torch can move at approximately 30 ipm. Burn-off rate of the copper-clad carbon electrode is estimated at about 3 in. every 3 ft.

A unique feature of this arc-air unit is the allowance made for heat created by it. In making adjustments of the torch during its operation, operator Walter Fox found that arc heat was too intense on his hand, even though he wore asbestos gloves.

After conferring with Frank Cherry on this uncomfortable situation, the pair arrived at a solution. It consisted simply of an oval piece of fine-mesh copper screen mounted between electrode and adjustment handle which, though it still permitted a clear view of the arc, drastically cut down radiated heat.

So effective is the screen that adjustments can now be made with a bare hand if necessary!

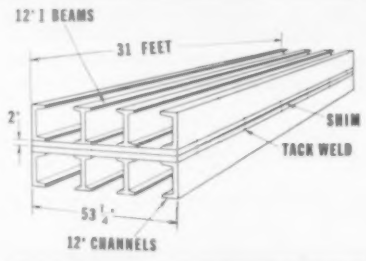
FINISHED plate edge *(below, left)* has slight kerf removed, and is then moved to mixer shell assembly station *(right)*. Weldor uses E6010 and 6012 electrodes to tack components. Plug welds on jacket were made with automatic submerged-arc unit.

And here's Baker Perkins' newest . . .

A manual job becomes automated

IMPROVISING WAS AGAIN the watchword at Baker Perkins, Inc., when its manufacturing engineers were recently confronted with a knotty fabrication problem.

The job—which looked a "block long"—was to produce four sides of a battery of huge press frames from structural steel. Each side weighed about 27 tons. Specifications also included two 2-in. low-carbon steel plates to be joined back-to-back.



The main problem was that manual welding would have taken about 40 minutes per pass. In addition, pouring so much heat into the 31-ft, 3/8-in. grooves for the fillet welds would cause distortion. And, finally, costs were likely to eat up the profits.

The setup provided by B-P in answer to these problems was not exactly standard procedure, but it was effective. It not only automated the operation, but also reduced welding and handling time by more than 50%.

A home-made cradle positioner, a submerged-arc head mounted on a rail, and some well-placed shims to pre-stress the long steel members were the three key elements in the setup.

Positioning units—two cradle halves supporting each end of the structural steel—formed a complete 70-in. diameter "wheel" when fitted together.

Cut-outs in each half-cradle easily handled the largest beam to be welded. The cradles themselves rolled on rubber-covered wheels, one set of which was power driven at variable speeds.

The spare submerged-arc head was mounted on special wheels to roll on a beam-track. The head was arranged to travel in one direction, pulling a flux recovery unit behind it. Power sources were two 500 amp a-c welders.

Four channels and four I-beams—each 12 in. high and 31 ft long—were welded to two back-to-back 2 in. plates 53 in. wide. Two channels and two I-beams were positioned outside and inside, respectively, on each plate prior to welding. The 2-in. plates, with their assemblies tack welded, were then placed back-to-back.

Prior to tack welding a series of clips on the backing plate sides, a 1/2 by 2-in. bar-shim was inserted between the plates. This pre-stressed the work in the direction opposite from the direction of warpage.

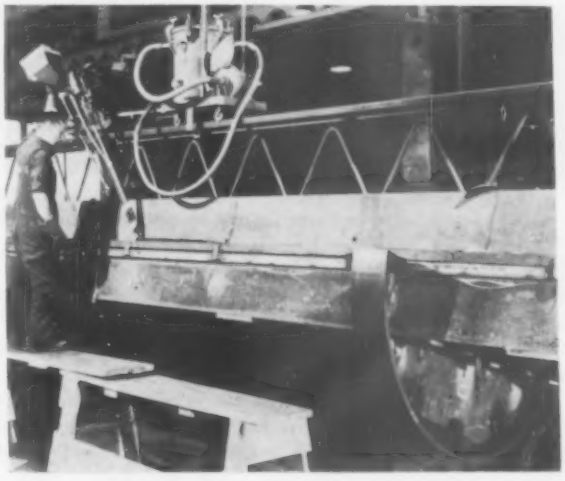
Shim size was determined from the amount of heat-caused warpage on the first job.

The welding unit traveled along the track and, depending on the joint, either 3/16 or 1/4-in. wire was used. The unit, welding at 18 ipm, took about 20 minutes to complete a weld.

Normally only 3/8-in. fillet welds were made and only one pass was required for each 31-ft groove along the edges of channels and I-beams. But when box type beams were welded, V-grooves were involved and required as many as 12 passes to complete a single weld.

With welding completed on the top assembly, the top cradle halves were placed on the bottom supporting halves, then fastened with bolting flanges and rolled 180 deg. The former bottom halves were then removed and welding was resumed. Cradle ends could also be spaced any distance to support various part lengths.

After final welding, the assemblies were stress relieved in a large furnace at 1,150 F and allowed to cool slowly. Clips and shim were removed from the back-to-back plates and structural members were sand-blasted to remove scale. A primer coat was the last step prior to a final machining operation.



RIDING on track is the submerged-arc welding head with flux recovery unit trailing; at lower right is one end of cradle positioner riding on rubber-covered wheels. Note backing plates are separated with shim in center

WITH THE AWS IN ST. LOUIS

At the convention

PROGRESS THROUGH WELDING—this was the title of the opening address at the annual AWS convention, a theme convincingly treated in technical papers presented throughout the meeting.

The talk was delivered by out-going Society President Clarence Sander, U. S. Steel Corp., early on Monday, April 14, when he welcomed many of the convention's 1,389 registrants. Site of the 39th annual meeting (and 6th annual welding show: see below) was St. Louis—a first timer on the list of AWS convention cities.

The week-long technical meeting featured 95 authors from all parts of the United States and Canada. Welding and related fields were covered in 21 sessions at which 63 technical papers were presented.

As part of the opening ceremony, Sander presented newly-elected AWS President Gustav O. Hoglund to the Society members. Hoglund, head of the welding section of Alcoa's process development laboratory, moved into the presidency after one year's service as first vice president. His term of office begins June 1.

Newly elected officers assisting Hoglund will be: first vice president Charles MacGuffie of General Electric Co.; vice president R. David Thomas, president of Arcos Corp.; and Society directors-at-large Ernest E. Geohringer, district engineer, Lincoln Electric Co.; Clarence E. Jackson, staff engineer, Linde Development Laboratory; Jack L. York, chief welding engineer, Delta Tank Mfg. Co.; Edward C. Miller, inspection engineer, Oak Ridge National Laboratory; Arthur A. Holzbaur, general superintendent, Sun Shipbuilding & Dry Dock Co.; Frank G. Singleton, owner Singleton Welding Supply Co.; Francis V. McGinley, Los Angeles assistant

SOME of the 1,389 registrants at the AWS convention renew acquaintances after registering at the Statler Hotel in St. Louis.

At the show

THEY CAME; they saw; they bought.

That about sums up the 6th annual welding show, held during mid-April in St. Louis. Approximately 9,000 persons registered at Kiel Auditorium, and a good percentage of these were buyers.

(Incidentally, we also saw an unusual amount of welding supply distributors making the rounds of exhibits. A sign of the times?)

Exhibitors were glowing in their accounts of sales made right on the Auditorium floor. One manufacturer of arc-welding accessories reported selling more items in three days at St. Louis than in all five previous shows combined.

Not all exhibitors had such tremendous success in on-the-spot sales, but most did admit purchases by show-goers exceeded expectations. Despite (or maybe because of) recession talk, an unusually large number of new processes and products were exhibited at the show for the first time.

(Advance reports on most of these were published in the past several issues of WELDING ENGINEER.)

GENERAL welding knowledge, as well as knowledge about its products, was tested by A. O. Smith Corp. at attractive booth, made more so by addition of two St. Louis models.

Among the new processes demonstrated were Bernard's "LC" welding system (see May *WE*, p. 46); Lincoln's "Innershield" (see May *WE*, p. 49) and its new "ML-3" semiautomatic mechanized submerged-arc welder (see April *WE*, p. 104); A. O. Smith's multi-arc d-c welding units (see April *WE*, p. 100), and Lewis' "LADC," an automatic directional control for guiding automatic weld-

district and sales manager, Victor Equipment Co.; James N. Alcock, owner Saginaw Welding Supply Co.; and Donald S. Howard, staff metallurgist, ACF Industries, Inc.

Thomas was further honored by presentation of this year's Samuel Wylie Miller Memorial medal for his "meritorious achievement which has contributed conspicuously to the advancement of the welding and cutting art."

"The Weld Heat-Affected Zone" was the title of the annual Adams Lecture delivered this year by E. F. Nippes, professor of metallurgical engineering and director of welding research at Rensselaer Polytechnic Institute.

The 1958 Lincoln Gold Medalist was Perry C. Arnold, chief field welding engineer, Chicago Bridge & Iron Co., for his paper "Problems Associated with the Welding of T-1 Materials."

Recipients of the A. F. Davis Silver Medals were Lynn S. Beedle, research associate professor, and George C. Driscoll, Jr., research instructor, both of Lehigh University, whose *Welding Journal* paper dealt with "The Plastic Behavior of Structural Members and Frames."

Clarence Jackson was also awarded the National Meritorious Certificate, in absentia, in recognition of his "counsel, loyalty and devotion to the affairs of the Society and his outstanding contributions of effort and time."

Honorary membership in the American Welding Society was awarded to Leon C. Bibber, chief research engineer-welding, U. S. Steel Corp., for his exceptional accomplishments in the development of welding.

Meritorious Certificate awards went to O. B. Bowers, T. Embury Jones, G. E. Linnert, L. C. Monroe, I. Morrison, A. J. Moses, Herbert Rogers, D. C. Smith, Thomas B. Smith, S. W. Snell, Robert E. Somers, H. S. Swan, Harry Udin, J. F. Wagner and Walter H. Wooding. The awards were made in recognition of their efforts and contributions to the advancement of welding.

Featured speaker at the Monday evening annual banquet was noted publisher, humorist, panelist Bennett Cerf, who spoke on the changing styles in American humor.

Other highlights of the annual convention were the discussions, seminars and open meetings conducted by Society members.

An informal panel discussion on practical shop operations was conducted at Kiel Auditorium on Tuesday. Headed by T. B. Jefferson, editor and publisher of WELDING ENGINEER, the panel included A. E. Adkins, Kaiser Aluminum & Chemical Corp.; H. Jackson, Thompson Pipe & Steel Co.; H. L. McElhoe, Smith Welding Equipment Corp.; P. G. Parks, Solar Aircraft Co.; and A. A. Wald, Caterpillar Tractor Co.

ing heads (see story on page 67 in this issue).

In the accessory field, Martin Wells displayed a new aluminum electrode holder containing only 10 parts. A cable-saving device is a feature of another Wells' electrode holder. (More details on this next month.)

Among newer alloys shown were International Nickel's "Inco-Hard 1" hardfacing electrode and "Inco-Weld A" wire and electrode; McKay's flux-cored hardfacing wire;

CONTROL problems were discussed by Square D representatives with these visitors.

WEST coast firm, Martin Wells, displayed line of electrode holders.

and Lincoln's flux-cored welding wire, which is the heart of its "Innershield."

The introduction of these alloys, as well as the processes like the Bernard system, poses a question: *is the industry reversing itself . . . is the trend back to open-arc welding?*

Certainly, St. Louis seems to indicate that this is the case.

the convention

Several committees found themselves in the midst of controversies during their St. Louis sessions.

NOTED publisher and humorist, Bennett Cerf, chats with Society officers prior to his talk at the annual banquet. *Left to right:* Secretary F. L. Plummer; out-going President Clarence Sander; Cerf; and newly-elected Society President Gustav Hoglund.

The educational committee meeting, for example, turned out to be more than the usual reading of reports. At about midway through the morning, a discussion concerning a proposed AWS brochure arose. One member objected to what the booklet, destined to be read by high-school and vocational-school students and their advisors, had to say about requisites for a welding engineer.

He was joined by others who felt that the title "welding engineer" has not earned the professional recognition it deserves, nor will it, until AWS and other interested parties do all they can to have more colleges award degrees in welding engineering than do at present.

"We need to define more closely the title of 'welding engineer' so the kids in high school will want to go into welding, and vocational guidance people will recommend it," one AWS member said.

Another felt that general education, with specialization on the graduate level or on-the-job training was sufficient.

Repercussions from stands taken at this meeting were felt in the nominating committee and are still being felt at this writing.

During the convention two tours were arranged for AWS members. The first was a tour of the A. O. Smith, Granite City, Ill., plant on Wednesday morning and the other to the Midwest Piping Co., St. Louis, on Thursday morning.

The convention offered the ladies (numbering 111) considerable diversion with luncheons and coffee hours. A tour of the St. Louis area, including the riverfront, historical sites and other interesting places was the main highlight.

the show

(Though not displayed at the welding show, another system, just introduced by Canadian Liquid Air, provides further confirmation of this apparent trend. Known as "Dynaweld," Liquid Air's is a semiautomatic process utilizing a precision-twisted mild-steel electrode that is flux coated within its spiral grooves. A more detailed description can be found on page 60 in this issue.)

Two comparatively new semiautomatic welding machines exhibited in St. Louis were those manufactured by Alloy Rods and Auto-Arc-Weld Mfg. Co. (the latter's machine was on display in the Stoody booth.) The Alloy Rods' apparatus prompts another query: *are makers of welding alloys going to invade the equipment field on a wider scale?*

Both of the above units operate on the open-arc principle, though Auto's "Magna" welder can be used with semiautomatic submerged-arc.

An apparatus for converting any a-c welding power source to d-c output was shown for the first time by A. O. Smith. The convertor, self-contained and portable, comes in two models—one for converting a-c to d-c output up to 250 amp, and the other up to 450 amp.

In the test-and-inspection field, DuPont introduced "Day Pack" roll film, 70mm wide and 200 ft long. Encased in continuous moisture-resistant opaque paper sleeves, it can be used during daylight without enclosure in holders or cassettes.

STUD-welding applications were discussed by these visitors to the KSM booth.

Some other show highlights:

National Cylinder Gas exhibited a new electronic tracing unit for automatic flame-cutting; Worthington's booth effectively displayed the firm's new line of manipulators and turning rolls; Vickers, primarily known for d-c equipment, introduced an a-c welding machine; the usual number of booths had the usual number of leggy models, let's stop right here.

WITH CAREFUL SELECTION AND USE,

Filler wire is the key to better titanium welds

INLET guides and front compressor cases for a jet engine are welded in a transparent plastic chamber by Tig process using argon atmosphere to avoid contamination of titanium by air.

By James H. Johnston
and Edward F. Funk

WELDING OF TITANIUM and its alloys presents problems similar to those of other metals, but are magnified by two major difficulties: air contamination and changes in thermal condition at or adjacent to the weld.

Since titanium can be welded only to itself, the arc is struck between the base metal and wire, which provides the filler metal. To achieve a high weld ductility an extremely low percentage of contaminants in the welding wire is imperative. The major problem has centered around the various yield strength levels of commercially pure titanium available.

These varying levels result from different oxygen contents, coupled with gas pickup during welding, and are further modified by the method of welding. The proper selection, however, of titanium wire for arc welding of unalloyed titanium is not as complex as rod selection for mild steel welding.

Understanding the methods of manufacturing titanium and its physical and chemical properties will help in selection and use of proper welding wire.

Titanium Production

Titanium sponge is ordinarily too pure to develop satisfactory strength if made into sheets or bars without oxygen alloying. Primary melting incorporates oxygen contaminated scrap, TiO_2, and/or high oxygen sponge in a carefully blended mix to gain the desired yield strength. This can now be done with such precision and assurance that guaranteed physical properties are routine, a practice unheard of in the steel industry.

The mill supplier may have started with titanium sponge with an oxygen content of 0.11 or 0.12% and a nitrogen content of about 0.01%. To this he may add 100 to 500 lb/ton of high oxygen scrap in the melt and as a result, produce 0.16% oxygen and 0.015% nitrogen. This melt will give a guaranteed yield strength of 70,000 to 90,000 psi.

The general range in production, however, is normally 75,000±3,000 psi in the bulk of commercially pure sheet. All mill suppliers are aiming at 45,000, 65,000 and 75,000 yield strengths for the three grades of titanium now being made commercially.

Wire Preparation

To make titanium welding wire, ingots are carefully selected for yield strengths not exceeding 55,000, 65,000 or 75,000 psi, and are bloomed to billets. After cleaning and grinding out surface defects, the billets are hot-rolled on a high speed, cross-country rod mill to 19/64-in. diameter, and then into coils of 50 to 100 lb. A series of tests are made at this time to determine suitability for wire-drawing operations.

After cleaning and spot grinding again, the hot-rolled rod is cold-drawn through tungsten carbide dies to required diameters on special wire-drawing machinery. The various grades of unalloyed titanium are cold-drawn according to their own limits of cold reduction.

Contamination by air and hydrogen pickup during annealing and cleaning operations is prevented by protective coatings, argon or vacuum annealing furnaces, and a rigid laboratory controlled pickle line. Use is made of a specially prepared oxidizing caustic molten salt for descaling, and a 25% nitric, 2% hydrofluoric acid bath for pickling. By frequent checks during pickling, hydrogen pickup is held to negligible amounts.

The final annealing temperature of unalloyed titanium is quite important, and is different for each of the three grades. Finally, certified physical properties are obtained from the finished wire and the wire is packaged or spooled for shipment.

Yield Strengths

Oxygen content of both sheet or plate and filler wire can be estimated from the yield strength, which can

ALL-titanium anodizing rack completed without special equipment. Lack of discoloration indicates weldments have excellent strength and ductility.

also be used directly to select proper filler wire to fit a particular welding job. The use of yield strength data obtained from tests on the sheet or plate to be welded, and on the filler wire before welding, are extremely valuable guides to start welding practices and assist in sheet, plate and wire selection.

Welding Guide

For example, when making a long straight weld on 75A heavy plate, a filler wire of about 65,000 yield strength should be used. If no protective atmosphere back-up is used, 55,000 yield strength wire is recommended. If no trailing shield is used, only 55,000 maximum yield strength wire is suitable since oxygen pickup will raise the yield level more than 20,000 psi.

If higher yield wire were to be used with no trailing shield, oxygen pickup and resulting yield strength increase would cause cracking. If the weld is to be made by manual Tig welding by an expert, 65,000 yield strength wire is suitable. If the welder is less than expert, 55,000 yield strength is necessary. Only if the job setup is perfect can 75,000 yield strength filler wire be used.

Alpha Alloys

When unalloyed titanium sheet or plate of 80,000 to 100,000 yield strength is to be welded with a very high strength weld, all alpha alloys—such as aluminum-tin alloy or newer alloys such as aluminum-tantalum-columbium alloy—should be used for filler wire. Hardness or tensile tests are not satisfactory for estimating contamination due to dilution of the alloy weldment by the unalloyed structure. Setup and personnel technique, however, can be checked beforehand by test duplication with unalloyed filler wire of known properties.

In all cases some oxygen and nitrogen will be picked up during welding, raising the weld's yield strength some 20,000 psi, and with proper filler alloy it will be brought up to that of the original plate. Practical experience indicates that a maximum of about 80,000 psi yield, or 0.175% O_2, is all that can be tolerated in any weldment with normal nitrogen of 0.01% and iron of 0.25%.

Hydrogen Content

Porosity in fusion welding is probably caused by hydrogen evolution during freezing. Titanium and hydrogen apparently form a simple, predictable gas-metal system at elevated temperatures. Extreme porosity resulted from welds made with 150 parts per million H_2. Vacuum annealing the same wire eliminated porosity.

Although it is impossible during melting to measure the behavior of the hydrogen-titanium system due to complexity of melting techniques involved, melting experience indicates that solubility of hydrogen decreases sharply from liquid to solid state at any given partial pressure.

Hydrogen partial pressures over the molten weld are very low except for moisture in the gun, in helium or argon absorbed as water, or in dirt on the wire. The sweep of pure, dry argon over the weld tends to lower hydrogen pressure in the gas phase to less than that in the metal.

Freezing Problem

The hydrogen, therefore, tries to leave the metal but is prevented by freezing. Changing gas flow rate, current, polarity, feed rates and weld speed to slow down freezing can improve the chances of hydrogen escape. Practical experience with hydrogen levels of welds suggests hydrogen actually is reduced in content during welding with proper setup.

Mechanical effects of hydrogen on titanium welds have not been thoroughly investigated. Stress cracking due to hydrogen will occur at lower hydrogen levels in welds than in sheet or bar stock because welds always involve some biaxial or triaxial stresses analogous to a crack, whether really present or not. Even under simple stresses with perfect flush-ground welds stress concentration is the rule, not the exception.

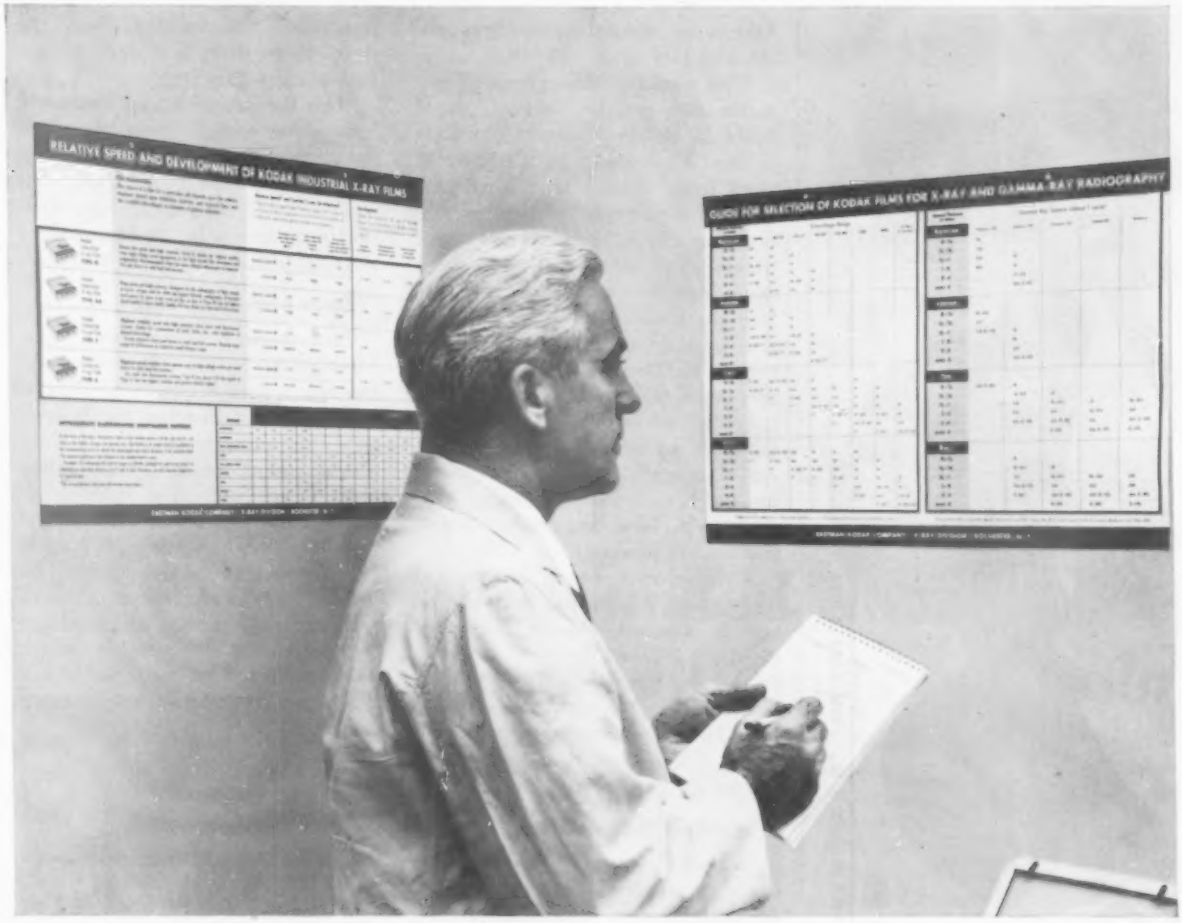
As notch impact tests show, fusion and heat affected zones are vastly different metallurgically from the parent plate even in unalloyed titanium. But it is not known whether this influences the hydrogen tolerances.

Wire Conditions

A center condition in unalloyed and other all-alpha alloys is very common and generally consists of a small hole running longitudinally through the wire. This defect is caused by one of four factors: excessive hydrogen content for cold drawing; over-drafting during cold drawing; rolling mill practice; and holes in the original ingot. If the wire is not too brittle due to the center hole and will feed satisfactorily in the welding gun, no detrimental effects are known to exist in the completed weld. A center hole condition does not cause porosity, but if severe can cause arc instability.

TITANIUM crucible for handling of highly corrosive chemicals was completed by manual welding.

As with other metals, surface cleanliness is of paramount importance in titanium welding for arc control and low contamination. Scratches, severely scuffed wire and even deeply grooved wire is common. These wire defects cut the inner parts of welding guns severely, but do not interfere with welding procedure unless improperly cleaned guns are used. Metal slivers also can occur and, if severe, the wire may


RELATIVE SPEED AND DEVELOPMENT OF KODAK INDUSTRIAL X-RAY FILMS
GUIDE FOR SELECTION OF KODAK FILMS FOR X-RAY AND GAMMA-RAY RADIOGRAPHY

Important Radiographic data at a glance

Free Wall Charts give you latest information on film selection, relative speed, and contrast.

TODAY's fast films and varied radiation sources give the present-day radiographer many new opportunities for establishing exposure factors to meet unusual conditions and get better radiographs.

So that you can have the latest information right before you, Kodak has prepared two quick-reference wall charts—one, a guide for selecting the best type film for your x-ray and gamma ray work—the other, showing relative speed, contrast, and development of Kodak Industrial X-ray Films.

These charts are yours—free for the asking. Just drop us a line and you'll get yours by return mail.

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y. 60-6

Gentlemen: Please send me your free wall charts of Radiographic data.

Name _____

Company _____

Street _____

City _____ State _____

EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N. Y.

Kodak
TRADE MARK

Dockson GOGGLES

REAL PROTECTION—TRUE COMFORT—TOP VALUE

DOCKSON'S complete line of goggles offers the finest, scientifically designed protection at minimum cost. Their many outstanding features and unusual comfort have earned them top preference in industry.

Write for complete catalog and name of your nearest distributor.

Dockson CORPORATION

3839 WABASH AVE • DETROIT 8, MICHIGAN

have to be rejected since slivers will cut and jam guns very easily.

Wire cracks are of no consequence unless dirt can be detected, or if oxide is visible when the crack is broken. A common type of transverse crack found in alloy wire is not particularly detrimental to welding, except that dirt in the crack may contribute to contamination. These cracks may indicate that the wire surface has absorbed considerable oxygen, possibly to a depth of one or two mils. Deep pickling normally overcomes this condition.

Precision-layer-wound coils are not yet available because suitable easy-to-operate spooling equipment has not been developed. But as long as the wire is wound neatly, no difficulties are presented.

When wire is wound on a spool, it is given a pre-cast. Proper pre-cast is obtained when a free loop of wire has about the same diameter as the spool on which it is wound. If the cast is too small, wire twists into knots between the gun and spool; if too large, it opens up and tangles.

Welding Techniques

Successful inert-gas shielded arc welding is obtainable in several ways. Although perfect oxidation protection is secured only in a gas-tight welding chamber, satisfactory shield can be obtained with either Tig torch or an automatic inert-gas gun. Trailing the gas shield behind the gun to protect the cooling weldment is necessary and inert-gas backing should be used. A heavy copper block with a shallow groove cut in it under the weld is commonly used.

Filler wire used with Tig welding must not be pulled from the protective gas blanket during welding, back filling must be avoided, and both filler metal and pieces to be joined must be completely free of oxides before welding. Multiple passes should be avoided, but when necessary, grinding or sand-blasting between passes should be employed to remove surface oxides.

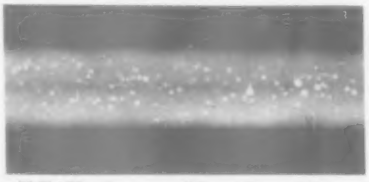
Helium or argon are satisfactory for replacing the air. Helium permits faster welding; argon is believed to give better protection. Mixtures of the two were recently found to give the best results. Actual gas flow rates and position or location of the welding nozzle and shield are of utmost importance. No welding should be done where there is a draft to disturb the gas flow.

With the proper set-up welds will have glossy metallic finishes without any signs of oxides on either top or bottom of the bead. Until such shiny-metallic white beads have been obtained, there is no need for making physical tests of the joints produced.

Spot And Flash-butt

Spot welding is relatively easy. Inert gas protection is not necessary, but cleaning of sheets by pickling is advisable. For effective results oxygen and nitrogen content of sheet material must be low with carbon content not exceeding 0.25%, although this value may be affected by other variables.

Weld strength is not affected by the direction in which sheet is rolled. Welding range is wide and need not be controlled too accurately except when particular strength welds are



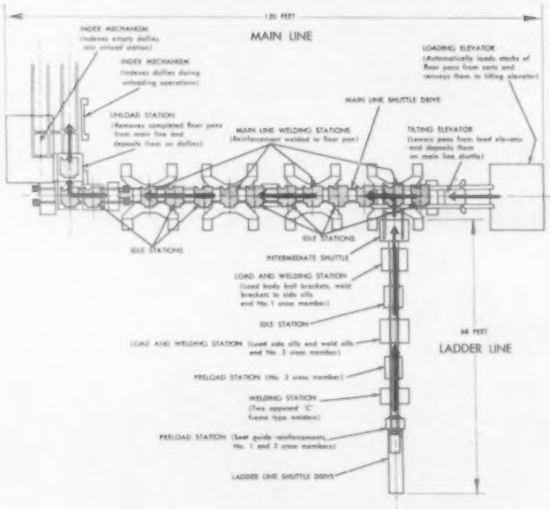
X-RAY of test weld made on titanium wire of hydrogen content higher than 90 ppm, showing severe porosity.

needed. Weld ductility is little affected by welding variables and penetration is always relatively high in range of conditions producing acceptable shear strength.

Titanium may be flash-butt welded with some advantages over other types of fusion welding because the molten air contaminated portion is partially ejected from the weld. But argon gas shielded welds are more ductile than non-shielded welds.

Techniques for other types of welding have not been fully developed. Flux-coated titanium electrodes are not available nor are fluxes for submerged-arc welding. Oxyacetylene welding cannot be done on titanium. Percussion welding is yet untried, and resistance butt welding is not commercially satisfactory.

As a guide to correct welding procedure, any welding program should be preceded by consultation with manufacturers of titanium metals and its alloys on the use of unalloyed low oxygen titanium.



The push-button age has reached automobile floor-pan fabrication

Automated welding line produces 500 units per hour

A HUGE L-SHAPED automated welding line is capable of producing 500 complete automotive floor-pan assemblies per hour.

Designed and built by Welding & Automation Machine Div. of Expert Die and Tool Co., Detroit, the new operation consists of two separate lines intersecting each other to form the L-shaped layout.

The 68-ft long ladder line is comprised of six stations —three of which are welding stations. The floor-pan reinforcing member is completely fabricated on this line by 48 resistance welding operations.

The main line—approximately 120 ft long—consists of six working stations in which the reinforcing member is joined to the floor-pan by 320 spot welds from four 18-ft high welding presses. This line also features unique automatic loading and unloading operations.

Component parts for the reinforcing member (two seat guide reinforcements and No. 1 and 2 cross members) are first manually loaded in the ladder line's first station. They are then transferred to the next station where two C-frame-type opposed resistance welders spot weld the components together.

In the next operation, at station three, No. 3 cross member is manually placed on the station fixture. At station four, side sills are loaded, and both sills and No. 3 cross member are welded to the assembly by a table-top welder.

Moving past idle station five, body bolt-brackets are loaded and welded to side sills and the No. 1 cross member at the last station. The other two cross members are also finished welded to the side sills, completing fabrication of the reinforcement member.

Transfer of component parts during fabrication is done by a lift-and-carry shuttle mechanism, hydraulically powered and operated by a 3-to-1 rack and pinion gear arrangement. Deceleration valves are used to provide rapid, shock-free indexing of the shuttle.

Nest and pin locators lift, transfer and lower parts onto the fixtures. The locators then move inward to clear the fixtures and are indexed back to the starting transfer position.

After the final welding operation, the ladder line shuttle carries the reinforcing member to an intermediate shuttle where it is then transferred to the first press station in the main line.

A floor-pan—arriving at the press station by means of loading and tilting elevators—has a reinforcement member nested into it by the press upstroke. Both parts are then carried to the weld position where 76 spot welds join them.

When this welding operation is completed, the press deposits the assembly on the main line shuttle. Moving through three other press stations, the reinforcement member and the floor-pan receive additional spot welds.

Between each welding or press station, the assembly is transferred to idle stations where it is lifted from the shuttle by outriggers to permit the shuttle to return to starting transfer position. In all, approximately 320 spot welding operations are performed in this line.

With completion of all welding, the assembly moves from the last press station to the unload station, where it is lifted by a toggle-elevator and pushed laterally by a chain conveyor to a four-bar linkage stacking machine.

This machine tilts each assembly into a vertical position and deposits them on a track-guided dolly. When fully loaded, the dolly automatically leaves the unload station, allowing an empty dolly to take its place.

The L-shaped line illustrates clearly the unlimited possibilities of automated welding.

Is the trend toward smaller, localized welding shows?

WHEN SPRING bursts out, conventions and welding shows are never far behind. Following this tradition was the second Santa Clara Valley AWS show.

More than 1,850 persons, relaxed by the famous California sun, roamed through approximately 16,000 sq ft of exhibits. One section attracted particular attention from show goers. This held the all-welded Army Personnel Carrier fabricated by Food Machinery Corp., located in San Jose, site of the show.

Largest piece of equipment, however, was the Continental-Wooldridge Earthmover. Nearby was another all-welded product—a mechanical cowboy. Farmers viewed it as a great advantage for holding cattle to be dehorned, branded, etc.

In all, 45 manufacturers were represented in 22 booths. Local distributors, according to R. L. Townsend, president of Tweco Products, Inc., who was in charge of exhibitor contracts at the show, selected booths in their own names; then displayed and demonstrated equipment of the firms they represented. In most cases, factory personnel attended these booths.

Also on display were small welded products, weld specimens, and welded jigs and fixtures. A touch of spring shades was added by a cluster of colored photographs included in a pictorial account of welded products from the surrounding area.

When the show ended, exhibitors gathered to discuss its merits. That it was a success is reflected by their vote to hold a third show at the same place in 1960.

PARTICULARLY interesting to spectators—among them 250 students—was this all-welded Army personnel carrier.

SANTA Clara AWS show committee enjoys luncheon before exhibition opens. *Left to right:* Don Fylling, C. B. Robinson, Mike Sebastian, Robert Woodling, Marcel Lampton, Ron Skow, Arnold Otto, Jim Grafton, Lon Mayer, Vladimar Zacharenko, Ray L. Townsend.

Low Temperature EUTECTIC WELDING ALLOYS®

Plant, Research Laboratory and World Headquarters

HISTORY OF "EUTECTIC LOW TEMPERATURE WELDING ALLOYS"®

Surface alloying at low heat was first discovered by "Eutectic" in 1904 – used today in over 100,000 plants. "Eutectic" is the originator and sole manufacturer of "Eutectic Low Temperature Welding Alloys" for bonding metals at low heat, minimizing distortion, warping and stress.

EUTECTIC Welding News

PUBLISHED BY EUTECTIC WELDING ALLOYS CORPORATION, 40-40 172 STREET, FLUSHING 58, NEW YORK, N. Y.

RUNS 100,000 MILES...

ON LOW COST "EUTECTIC" OVERLAY

The bearings in this truck tractor's differential jammed, forcing rotation of the bearing races, galling the housing. A replacement was not only difficult to obtain, but represented a substantial investment.

The possibility of repair by overlaying was discussed, but no facilities were available for the complicated and excessive heat needed with conventional welding methods. It was particularly important, in overlaying the differential, to avoid warpage, distortion or embrittlement, and the finished deposit had to be machinable. A local "Eutectic" Technical Representative was called in. He recommended EutecRod 185 FC be used: a patented high wear resistant BronzoChrom alloy for the toughest bronze surfacing build-up. EutecRod 185 FC is particularly valuable on surfaces requiring constant resistance to frictional wear, and for general maintenance and joining. It has been used successfully in building up broken gear teeth, worn bearings, valve seats and pistons. Its low heat requirement even allows the joining of galvanized iron parts without damage to the zinc coating.

Fully machineable, EutecRod 185 FC supplants bronze welding and gives harder and tougher deposits having high ductility, a low coeffecient of friction and excellent corrosion resistance. Hardness is deposited, BHN 110; work hardness to BHN 200, and is deposited without fusion of the surface of the base metal.

The illustration shows the shaft successfully built up with 185 FC. This highly machineable overlay has such unusual toughness that it will outlast the bearing surfaces of a new shaft. The truck into which this shaft was replaced has since completed over 100,000 miles of rugged highway travel without any appreciable signs of wear.

The cost of welding and machining was only a very small fraction of the cost of a new shaft.

HARD ALLOY OVERLAYS PUT "BITE" IN ROCK BITS

The high cost of bits for oil drilling has made it necessary for all operators to investigate ways to extend tool life.

EutecBor 9, another "Eutectic" super high alloy overlay is growing increasingly popular for this purpose. It offers the utmost in heat, wear and corrosion resistance at normal and elevated temperatures, yet features an amazingly low application temperature; between 1800° and 1900°F. Mirror smooth, longer lasting deposits of RC 55-62 are obtainable without danger of penetration or undercutting.

EutecBor 9 permits repair and renewal of rock bits, core bits, hole bits, casing scrapers, reamers, reaming bits, fish-tail bits and similar tools and parts.

EutecRod 185 FC, available in 1/8", 3/16", & 1/4" dia. Extruded pink flux coating. • **EutecBor 9,** available in 3/16" dia. Lt Blue Tip. Standard weight shipments.

FREE!
180 PAGE WELDING DATA BOOK
Invaluable procedures and theory of welding practice on all metals.

Eutectic Welding Alloys Corporation
40-40 172nd Street, Flushing 58, N.Y.

Yes! I'd like to receive your FREE 180 Page WELDING DATA BOOK.

Name _____ Pos. _____
Company _____
Address _____
City _____ State _____

EUTECTIC 'LOW TEMPERATURE WELDING ALLOYS'® FORMULATED FOR 'LOW HEAT INPUT' BONDING OF ALL METALS INCREASE SAVINGS BY SALVAGE AND REPAIR, SOLVE PRODUCTION PROBLEMS

Aluminum curtain-wall "clothes" Manhattan building

ALL decked out in its new suit is the artist's rendering of 34-story Uris Brothers' office building.

"TAILOR" welds curtain-wall mullion bracket to steel framing after final alignment with instruments.

CLOTHES MAKE the man, as the old saying goes—and outward appearances also make the building.

In this case, the "clothes" are approximately 174,000 sq ft of aluminum curtain-wall for the new 34-story Uris Brothers' office building in New York City—"tailoring" by Michael Flynn Mfg. Co. of Philadelphia.

Vertical structural mullions—spaced on approximately 5-ft centers—were anchored to the steel structure by a system of bracket assemblies, which were first adjusted then permanently secured by manual metal-arc welding.

Steel components of the building were resistance welded in the Flynn plant by three different methods:

(1) Flash welding: using a 220-volt, 60-cycle, single-phase power source with a 75 kva capacity.

(2) Spot welding: employing numerous welders with capacities from 30 to 150 kva; production range included welding $\frac{1}{8}$-in. to $\frac{1}{8}$-in. steel, down to $\frac{1}{8}$-in. to 18-gage steel.

(3) Projection welding: three spots at a time in specially jigged operations, which included joining a 3/16-in. hinge to $\frac{1}{8}$-in. rolled steel. Capacity of the welder was 150 kva, 220-volt, 60-cycle, single-phase. All time functions were electronically controlled.

For aluminum welding, the Mig (metal inert-gas) process was used, particularly on hinges in case-

WORKERS caulk joint between aluminum flashing and floor slab. Flashing directs condensate into drainage gutter at frame bottom; gutter drainage holes (circled) carry moisture to outside of building.

WELDOR uses Mig gun to join hinges to aluminum window casements. Mig welding process was chosen because of its speed and lower (than Tig) costs and is also used to reinforce mechanical joints in window.

ment windows and for reinforcing mechanical joints in windows. Mig was also employed on most of the conventional joining jobs, such as special attachments to windows, and miscellaneous trim consisting of sheet metal assemblies or extrusion assemblies or combinations of both.

In welding aluminum parts, the Tig (tungsten inert-gas) method was first used, but was later abandoned in favor of Mig welding because of its greater speed and lower costs.

Flash welding machines used for welding aluminum featured "pinch-off" dies. Spot welding units made welds ranging from ⅛ to ⅛-in. aluminum weldments, to ⅛-in. to 1/16-in. aluminum. Both flash and spot welding were done with 150-kva, 60-cycle, single-phase units.

The curtain-wall system is combined with tempered black glass spandrels textured to reduce distortion and reflection.

FLASH welding of aluminum frames was done in the Flynn plant.

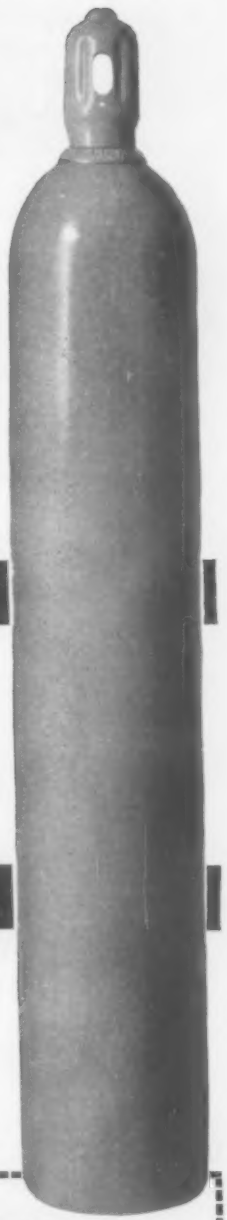
The whole "skin" is designed so the entire wall can expand and contract while remaining watertight. Aluminum flashing was installed between each floor slab and the horizontal gutters that are integral with each window unit.

These gutters, by means of small holes at regular intervals, carry off all condensation and moisture to the exterior of the building. Special ventilator sashes alternate with fixed windows, and permit all window areas to be cleaned and washed from inside. Spandrels below each window are glass, integrally colored and inserted in aluminum frames.

Another new 30-story curtain-walled office building is on the agenda for Uris Brothers and will be built by the Flynn Co.

Hackney MILWAUKEE

streamlined high pressure gas cylinders* cut distributors' shipping costs



There was a time when backbreaking weight was a sign of safety in high pressure gas cylinders.

Then HACKNEY deep, cold drawn process eliminated costly excess weight without sacrificing *safety and durability.*

As a result, high pressure gas distributors are able to:

- save money on shipping charges
- reduce handling costs—minimum manpower needed
- cut maintenance costs—smooth surfaces easily cleaned and painted
- speed handling—more product per pound of steel
- make faster deliveries customers appreciate

More reasons for owning HACKNEY High Pressure Gas Cylinders

- Uniform cylinder capacity—simplifies filling.
- Surface free of crevices, ridges—always looks attractive.
- Light weight—easier to handle.

**Available in all shapes and sizes to meet your customers' requirements—from small medicals to 220's and 250's (cu. ft.) for oxygen, hydrogen, nitrogen, helium, argon and carbon dioxide.*

Uniform sidewall thickness—from top to bottom, side to side of cylinder. Shown: typical section of Hackney cold drawn cylinder showing uniform wall thickness.

For complete specifications of Hackney cylinders for high-pressure gases, prices and other helpful information, write to:

Pressed Steel Tank Company

Manufacturer of Hackney Products since 1902

1456 South 66th Street, Milwaukee 14, Wisconsin

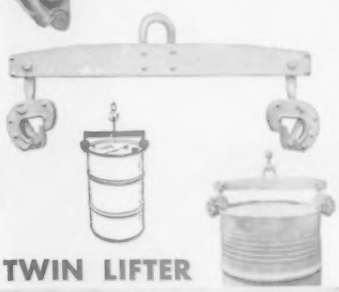
Branch offices in principal cities

CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS

YOUR BEST MOVE . . . MOVE
with MERRILL
MATERIAL
HANDLING
DEVICES

4
SIZES

LIFTING
CLAMP



TWIN LIFTER

DRUM LIFTER

DRUM TILTER

HAND GRIP

DRUM OPENER

For Interesting Information write

MERRILL BROTHERS

56-81 Arnold Ave., Maspeth, N. Y.

3-2-6

Does he use America's oldest torches?

DOCTORS HAVE LONG studied geriatrics, the science of old age. But no medical man has yet reported the history of two torches that have been used in production since June, 1929.

The case begins in that year when John Salpacka joined Chicago Bridge and Iron Co., Chicago. He was issued a Linde "Oxweld Type W-1" welding torch and a "Type C-6" cutting torch.

Salpacka has used one—or both—every working day since. Manufacturing data reveals, however, the cutting torch was turned out in 1928 and the welding torch in 1922.

Like many men who depend upon a tool to gain a living, Salpacka has given the torches names. The welding torch is "Old Reliable" and the cutter is "Old Betsy". A conscientious workman, the 61-year-old weldor has fashioned a set of radius cutting attachments and other devices for his tools.

Although CB&I has replaced most of its welding equipment many times, Salpacka clings loyally to his old cronies and maintains they can do anything newer models can do.

"'Old Betsy' is much more sensitive than any other cutting torch," he insists, "The supply of cutting oxygen can be easily adjusted by the slightest changes in pressure on the cutting oxygen valve.

JOHN Salpacka and "Old Betsy" cut elbow sections. Torch was manufactured in 1928.

"Both of these torches are easily adjusted to the required flame and I like the way they handle. Besides," he adds with a twinkle in his keen, blue eyes, "they're old friends."

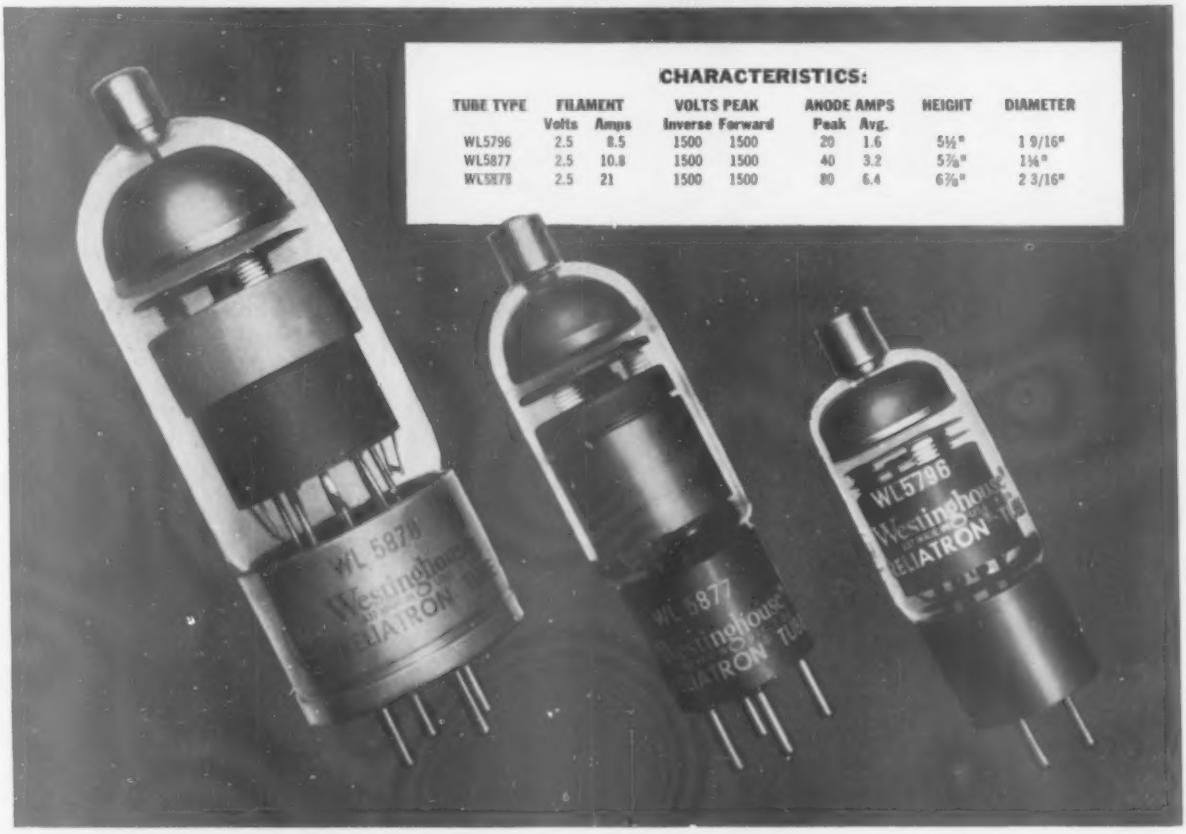
But even old friends become crotchety, and Linde salesman Gus Olsen, who handles the account, frequently has to scour Chicago for replacement parts. But he doesn't mind; after all, his father, Carl, introduced the "C-6" to American industry.

Warren Thompson, of CB&I's Purchasing Dept., takes a philosophic view of this problem in longevity. "As long as they do the work, we'll keep them on the job. As it looks now, the only way we'll be able to retire those torches is to wait until John Salpacka retires. And both John and the torches look like they have many good years ahead of them."

WELDING ENGINEER would like to know if any of its readers have torches which have seen longer service. If you have, write us and let us know.

"OLD RELIABLE," Salpacka's welding torch, heats a water tank girder to remove camber. Serial numbers indicate this torch was made in 1922. Salpacka has used it since 1929. Does this set a record for torch longevity?

New Xenon-filled Westinghouse THYRATRON TUBES IMPROVE welding equipment efficiency!


CHARACTERISTICS:
TUBE TYPE | FILAMENT Volts | FILAMENT Amps | VOLTS PEAK Inverse | VOLTS PEAK Forward | ANODE AMPS Peak | ANODE AMPS Avg. | HEIGHT | DIAMETER
WL5796 | 2.5 | 8.5 | 1500 | 1500 | 20 | 1.6 | 5½" | 1 9/16"
WL5877 | 2.5 | 10.8 | 1500 | 1500 | 40 | 3.2 | 5⅞" | 1¼"
WL5878 | 2.5 | 21 | 1500 | 1500 | 80 | 6.4 | 6⅞" | 2 3/16"
WL 5878
Westinghouse
THYRATRON
WL 5877
WL5796
Westinghouse
THYRATRON

Compact new design saves space, gives superior performance and uniform quality!

If you are designing new welding equipment, you'll find new Westinghouse Xenon-filled Thyratrons the most advanced you can use.

CHECK THESE OUTSTANDING PERFORMANCE CHARACTERISTICS:

- 12 to 1 peak to average anode current rating.
- 1,500 volt forward and inverse voltage rating.
- 15 second averaging time.
- Operate in broad ambient temperature limits (-55° to 70°C).
- Fast cathode heating time.
- Small compact construction.

These new tubes will improve performance in existing equipment, too. Check your tube complements now to find replacement applications for Westinghouse Xenon-filled Thyratrons.

DIRECT INTERCHANGEABILITY

Westinghouse Type	Replacement For
WL5796	6478
WL5877	5544, 730
WL5878	5545, 6807, C6J, 5685, C6J/K, 760, 761, 6858

To learn how Westinghouse Thyratrons can fill your welding requirements, write today for detailed data. Westinghouse engineers will be glad to consult with you, if you wish. Sample orders available for immediate shipment.

CLIP AND MAIL COUPON NOW

COMMERCIAL ENG. DEPT., ELECTRONIC TUBE DIV.
WESTINGHOUSE ELECTRIC CORP., ELMIRA, N.Y.

Please send me full information on the following Thyratron Tube(s):

☐ WL5796 ☐ WL5877 ☐ WL5878

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

YOU CAN BE SURE...IF IT'S **Westinghouse** Electronic Tube Division Elmira, N. Y.

Never before at this LOW price!

Smith's new "Big 98" for $98

All purpose combination WELDING CUTTING outfit

DOES MULTIPLE JOBS . . . welds, burns, heats, brazes, solders and treats your pocketbook kindly—the best buy of the year! Welding range, with 3 tips supplied, is 1/32" to 3/8", but nine other tips increase welding capacity to 7/8". With the cutting assembly and tip furnished, you can burn steel from 1/8" to 1" in thickness (other tips increase cutting range to 4")—*clean, high speed cuts with minimum gas consumption.*

SLIP-IN TIPS make operation easier and faster. Tighten with finger pressure only—no wrench needed. Special-purpose tips (send for free Smith's catalog) adapt this torch to scarfing, rivet washing and gouging. All Smith's tips have recessed, damage-proof seats. Exclusive "Flo-Trol" diaphragm stops causes of backfires—eliminates seat burn-out by preventing reverse flow of acetylene: protects torch against premixing of gases—reduces downtime.

Just introduced! New AIR-LP GAS TORCH KIT. Ideal for soldering, light brazing, leading, thawing, general heating—many more jobs. Write for Bulletin HHP-1.

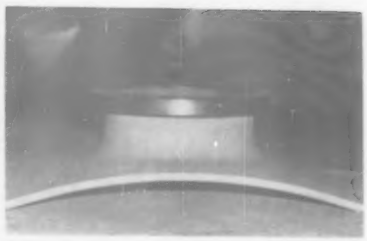
SMITH'S

SMITH WELDING EQUIPMENT CORPORATION

WRITE TODAY FOR DETAILS

2623 FOURTH STREET S. E.
MINNEAPOLIS 14, MINNESOTA

FOR 40 YEARS
One of Americas pioneer manufacturers of equipment for welding, cutting, heating.
INTERNATIONALLY DISTRIBUTED



CLOSEUP of new flued manway. This is said to be the first time 100% X-raying could be done on such units.

100% weld X-ray possible on manways

HIGH-PRESSURE storage tanks with flued manways that eliminate overlapping double joints and permit 100% X-ray inspection of all welds have been developed by Advanced Products Div. of ACF Industries, Inc.

According to Rudolph Furrer, division president, these "uni-formed" units are the first storage tanks to be marketed with 100% X-ray of all manway welds.

The firm is presently making the new tanks in capacities up to 30,000 gal at its Milton, Pa., plant.

"Uni-formed" construction, states President Furrer, proves advantageous, not only because it can be fully X-rayed, but also because it is free of the unplugged holes used in conventional manway collars which lead to corrosion between collar and tank.

The company's new series evolved from successful experience with flued manways on railroad tank cars. Although such manways were used on these units for several years, this is said to be the first time they have been incorporated into large storage tanks.

Conventional storage-tank manways are made by cutting a hole in the tank, fillet welding a steel cylinder inside it, and strengthening the joint with an exterior collar.

Now, the manway base is drawn or "flued" from plate which becomes a section of the tank itself. In this way, a smoothly curved, unbroken configuration is possible where manway meets tank. Steel

BUTT welded manway in place. Welding also helps make section lighter, shorter.

used for this purpose is heavier than that used for the tank's shell and heads. In one series, this is 1⅝-in. steel for manways and 15/16-in. steel for shell and heads.

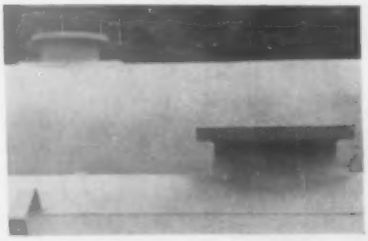
The 18-in.-diameter manway is hot-formed on a hydraulic press with a blank-holder and punch. Edges of the section and its newly formed flue are then reduced by machine.

Each of the four edges—two straight and two curved—are butt welded by submerged-arc to corresponding surfaces on the tank. The flue's open end is also butt welded by sumerged-arc, but to a short cylinder which becomes the manway cover's base. It is at this point that all welds are X-rayed inch by inch.

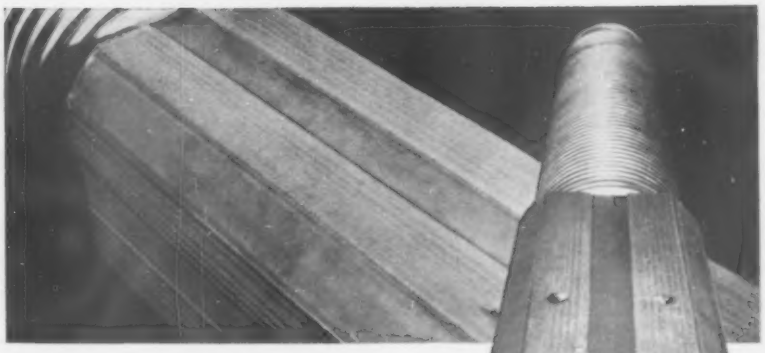
Following welding, and as a final safety measure, each completed tank is stress relieved in a furnace to take working pressures of 250 psi.

Two tank series are being produced. The larger series, comprising five tank sizes, can hold up to 30,000 gal and have an ID of 10 ft 3 9/16 in. The four sizes of the smaller series can hold up to 12,000 gal and have a 6-ft 5¼-in. ID.

The rounded contour of the manway's interior surface greatly facilitates lining the tank, Furrer said. He added that, structurally, a flued opening is superior because stress concentration is more uniform than in a built-up opening.



BACKGROUND: conventional manway assembly. Foreground: new flued and welded manway.



SAVED FROM THE SCRAP PILE!

MIG-welded overlays with AMPCO-TRODE® 10 Bare Wire add extra years of service

It would have been expensive to replace this rolling-mill screwdown post. But the company didn't have to. Instead, they built up the wear surfaces with overlays of Ampco-Trode 10 Bare Wire — at but a fraction of the replacement cost!

With level-wound Ampco-Trode 10 wire, you get fast build-ups on overlays. It feeds easily through the gun with fewer burn-backs. Deposits have hardness of 160-190 BHN — resist metal-to-metal wear and corrosion.

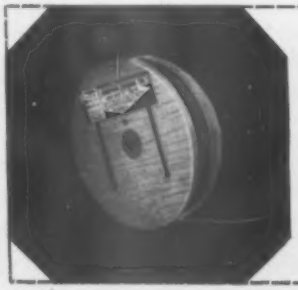
Ampco-Trode 10 Bare Wire also provides high-strength, crack-free welds on aluminum bronze, silicon bronze, and manganese bronze. And you get clean, dense deposits on iron-base metals—cast and malleable iron, galvanized iron, and high-alloy steels and irons. You can even make sound welds joining one of these metals to another.

Order Ampco-Trode 10 Bare Wire from your nearby Ampco distributor. Tear out coupon below and mail today.

AMPCO METAL, INC.
MILWAUKEE 46, WISCONSIN
WEST COAST PLANT: BURBANK, CALIFORNIA
SOUTHWEST PLANT: GARLAND (DALLAS COUNTY), TEXAS

AMPCO®

W-149



AMPCO METAL, INC.
Dept. WE-6, Milwaukee 46, Wisconsin

Send me Bulletin W-17 for further information on Ampco-Trode 10 Bare Wire and other Ampco electrodes.

Name.....
Company.....
Address.....
City..... Zone..... State.....

the welding clinic

Here you may find the solution to your welding problems, whether they concern design, production, construction or maintenance welding. Submit your questions for answering on this page.

Electrolytic production of oxygen

Question:

I would like to know more about the electrolytic process of producing oxygen. If you would give complete details of how this is done, it would be greatly appreciated.

Answer:

Basically, the process consists of passing a direct electric current through water containing a small quantity of acid or alkali. The current forces the water to decompose, releasing its elements, oxygen and hydrogen. The oxygen accumulates at the positive pole; the hydrogen at the negative pole.

The process was first utilized in 1800 by Nicholson and Carlisle, who demonstrated that passing a current through water by dipping the two terminal of a voltaic pile into it would produce oxygen and hydrogen.

Strictly speaking, pure water breaks into hydrogen and hydroxyl ions and for commercial use its conductance is negligible. For this reason, the water is strengthened as a conductor by the addition of an alkali—frequently caustic potash—or an acid. Commercially, alkalis are most often used because of their lower cost and because more materials are resistant to their chemical action.

When d-c is passed through an alkaline solution, the water is decomposed by a primary and secondary reaction, with hydrogen liberated at the negative pole, or cathode, and oxygen released at the positive pole, or anode.

Equipment you would need for such a process includes a container suitable for holding the alkaline or acid solution (the electrolyte); an anode which is submerged in the solution and carries the current into it; a cathode, also submerged in the solution and which receives the current and leads it back to its source; a dividing wall to separate the gases, and, finally, a means of collecting the gases and directing them to some desired point.

D-c is used because the evolution of the gases must always be at the same places. It *is* possible to use a-c, but this means each pole will change from anode to cathode as rapidly as the current alternates in direction.

No commercial a-c electrolytic equipment is being sold, as far as we know, and all commercial equipment is operated by d-c.

Thermal efficiency of electrolytic oxygen producers vary, from about 70% to almost 90%. When hydrogen is in demand, firms will use electrolysis because it releases two volumes of hydrogen to each one of oxygen.

Units for small plants are connected in series. In larger plants, however, units are joined in parallel series so that a multiplication of tanks is possible.

Electrolytic production does, nevertheless, have its drawbacks. First, practical considerations often make it unfeasible for many operations and, second, there is a potential for explosions.

For this reason, many large-scale oxygen producers use the air liquefaction process, which has been described in detail in the past by WELDING ENGINEER.

Briefly, however, the method works like this: air is pulled into a plant through large suction towers powered by compressors. These compressors boost raw atmospheric air, in steps, up to about 2,200 psi. The air travels to ammonia heat exchangers, where its temperature is lowered to —40 F.

From the exchangers, the cold air is sent to expansion booster engines, which siphon off about 35% of it for their own power and for refrigerating purposes. (This air, however, is returned to the cycle when the air drops to —283 F, almost the liquefaction point.)

The air is liquefied by the exercise of the laws of expansion, i.e., large volumes of air are pressured through small openings. An expansion valve on an interchanger is the key to this.

Forcing air into the interchanger, which houses a rectification column, through a ½-in. expansion valve at 2,000 psi, has a tremendous cooling effect on it.

Before it reaches the rectifier column, at which point it will be "boiled" (actually, liquefied), the air is scrubbed clean of carbon dioxide, moisture and other impurities by traps and stone filters.

After cleaning, the air reaches the rectification column, heart of the exchanger. Here the main constituents are boiled off. Nitrogen and argon—important products of the cycle—are tapped and diverted to storage areas, where they remain in a liquid state.

The oxygen, which is now liquid and at a temperature of —297.46 F, leaves the interchanger to again be cleaned and to be tested for purity before it, too, is stored.

ASK THE MAN BEHIND THE GLOVE . . .
He'll tell you that
Carol DYNAPOWER WELDING CABLE
is the best because of its exceptional flexibility, extraordinary strength, extra-long life . . . and it is readily available from a network of warehouses across the country. Furnished on 500 or 1000 ft. "no-charge" reels or in coils.
When you call for cable — call for Carol.
MEMBER
Carol®
CAROL CABLE COMPANY
Division of the Crescent Company, Inc., Pawtucket, R. I.
CAROL AWG 4/0 NEOPRENE WELDING CABLE
CAROL AWG 4/0 NEOPRENE WELDING CABLE

with

P&H

Iron-Powder Electrodes

Weldors can really pour it on with P&H Iron-Powder Electrodes! Faster deposition and superior weldability make them easy to handle in any position—enable operators to produce X-ray welds by simply dragging the electrode. Added benefits: a minimum of spatter and low stub loss.

Welds are smooth and practically self-cleaning — possess high strength with greater impact at low temperatures. Get Bulletin R-29. Write Dept. 302B, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

HARNISCHFEGER

P H WELDERS • ELECTRODES • POSITIONERS

WELDOR uses the new automatically fed, coated electrode to fabricate heavy structural-steel footings.

ENLARGEMENT of a length of the recently introduced, precision-twisted filler wire.

New welder makes debut

A WELDER WHICH automatically feeds a *coated* wire electrode for mild steel welding has just been introduced to the welding world.

Designed and developed by Canadian Liquid Air Co., Montreal, engineers and researchers, the semi-automatic process was released after more than a year of field tests in several major Canadian industries. It is known as the "Dynaweld" system.

Reportedly as simple to operate as stick electrodes, the new welder has additional advantages of eliminating stub waste and increasing productivity when properly used.

Increased production results from the high-duty cycle and the fact that higher current values can be used, thereby depositing larger amounts of weld metal. The system is independent of water cooling or gas shielding, and is another example of the industry's tendency to return to open arc welding.

Stellar feature of the new process is a precision-twisted, coated filler wire which is essentially a "continuous", coated, mild-steel electrode.

This wire is drawn from a power-driven supply reel at pre-determined speeds and is fed through an especially designed pistol-type electrode holder. Although current can be supplied by either a-c or d-c welders, the latter is preferred.

The developers of the Dynaweld system have deliberately simplified the design. No auxiliary equipment is needed other than the source of welding current.

Mounted on rubber tires for easy movement and equipped with a hoisting frame, the machine has few moving parts and maintenance is said to be negligible. Incorporated into the portable welder is a mechanism which controls and feeds the wire to the work at its pre-determined speed.

Liquid Air recommends the new process for mild-steel welding operations where conventional or iron-powder electrodes are now being used. Metallurgically, they state, weld deposits made by the wire are comparable in every way to those laid by E6012, E6024, and E6020 electrodes.

Confident of its product, the firm offers to make on the job studies of plant welding operation to determine the suitability of the Dynaweld system for such work.

40% lighter*... a man can carry it in one hand

30% smaller... he can pass it through a 12" hole

powerful enough to go through 2" thick steel, 5" aluminum

*Weighs only 73 pounds . . . *without sacrificing protective lead-shielding (offbeam radiation level is only 7 mr per hour at 6 feet)*

You can get immediate delivery on a new ANDREX 160 KV lightweight portable unit.
Call any Picker branch office (see local 'phone book) or write
Picker X-Ray Corporation, 25 South Broadway, White Plains, N. Y.

PICKER... one stop for everything in industrial fluoroscopy and radiography

ANDREX lightweight portable x-ray units—130 KV, 160 KV, 200 KV, 260 KV and *Andrescope* X-ray Stress Analyzer.

PICKER x-ray units—5 to 50 KV, 150 KV (stationary and mobile), 270 KV portable, 260 KV heavy-duty, x-ray diffraction apparatus, rayproof inspection cabinets.

ACCESSORIES . . . films, tanks, darkroom sundries, illuminators, *everything*.

TECHNICAL OPERATIONS units for isotope radiography—sources, equipment, containers for Iridium ^{192} Cobalt ^{60} and Thulium ^{170}.

Picker x-ray

AS THIS YEAR progresses, the American public will come to recognize the importance of welding . . . we hope.

Our campaign to promote September as National Welded Products month at last seems to be catching hold, and we are especially pleased with our readers who write in to ask "What can I do to help?"

All of us who deal with the welding processes—so ideally suited for joining metal—want welding to get the acclaim it deserves. This recognition, in turn, will help promote a stronger, more vital industry.

Welding, a basic essential to scores of products, is often accepted without questioning. It is there—unobtrusive and unnoticed. With your cooperation, we can make people look, and see, how great a part welding plays in their businesses, their homes and their lives.

How do we start?

For those in the welding industry, a favorite topic of conversation should be welding . . . every newspaper, magazine and piece of advertising should carry the "Remember September" slogan . . . wear tags, print signs . . . do all the things important to a good campaign. Discuss, explain, promote, sell welding. News travels fast by word-of-mouth.

If you work for a firm that turns out welded products, suggest to the executives, particularly the advertising manager, that from now through September your ads mention the fact that your product is welded. A sure way to point out National Welded Products month is to have a reproduction of the insignia shown here (greatly reduced, of course) inserted in all your advertising. WELDING ENGINEER will be happy to send you a one-color proof suitable for reproduction.

If your company manufactures equipment used in welding, or welding rods and supplies, you will want the public to know that the finest products are created through welding. Mention it in your ads!

September is only three months away. We will have to work hard and fast, but by the end of September, all America should have the word "welding" on its lips; and in its mind—the knowledge that welding turns out the best products, gives the best results.

Salvaging silver from brazed honeycomb

ENGINEERS ARE RESORTING to the use of brazed stainless steel honeycomb for high-speed airframes to get strength, lightness and heat resistance required. Silver brazing alloys are used. When this alloy finds its way to the scrap heap, what will happen?"

These are the words of a worried government official, quoted from a Defense Department bulletin, in an article titled "In anticipation of a problem."

"If the honeycomb is melted down," the official continues, "the silver will enter the alloy. Experience with austenitic stainless steel containing silver has not been good. With respect to corrosion resistance, they are reportedly far inferior to silver-free 18-8 alloys.

"The problem will not arise for a number of years. Nevertheless, it appears likely that a solution to the question will eventually be needed. A change to a less contaminating brazing alloy might be one answer. Dilution of scrap might be effective, as it has been in other cases, but dilutioning time creates problems of its own and is not usually a desirable solution."

One could almost believe the Baltimore Div. of Martin Co. had been anticipating the Defense Department's "anticipation." The firm has worked with silver brazed honeycomb almost since its inception, and

its quality control and manufacturing research and development groups have been well aware of the potential loss of silver, according to Maurice M. Wilkinson, a Martin Co. chemical/physical engineer.

This was particularly the case with honeycomb sections destructively tested and with units which had served the purposes for which they were fabricated.

Researchers estimated five troy ounces of silver (worth approximately $4.45) were used in each square foot of stainless steel honeycomb. Left in while the stainless was remelted, the silver would mix with it, rendering the stainless more susceptible to corrosion and lowering remelt value of the scrap.

Martin engineers discovered the solution *in* a solution. By soaking the brazed stainless in a tank of 50%

SILVER brazed honeycomb formed from 17-7PH stainless is reclaimed here by dipping into nitric acid solution.

nitric acid for approximately 20 hours at room temperature, they found silver was completely dissolved and stainless detail parts were undamaged.

They then sent the solution to Handy & Harman for reclamation of the silver. Later, it was found that the idea would work as well to remove silver from processed industrial X-ray film.

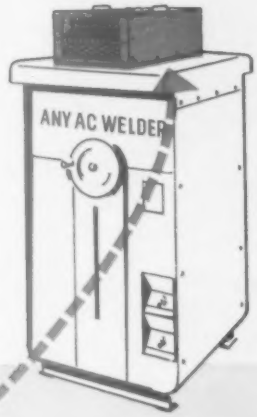
In this way, the company eliminated waste in planning periods, recovered silver at a profit, lifted the value of the stainless, and, accordingly, stretched the taxpayer's dollar.

Convert any* a-c welder

New A. O. Smith convertor units give any shop more versatility

Compact 250-amp and 450-amp units sit on top of *any* a-c welder.

to d-c in 60 seconds!



New way to up flexibility

Now, with either of two A. O. Smith convertor units, *any* a-c welder in your plant can be quickly converted to all of your d-c welding needs.

Either of these two new A. O. Smith convertors can be used with *any manufacturer's a-c welder of any amperage!*

And, as indicated below, you can hook up these convertors in a matter of seconds — for temporary, intermittent or permanent operation.

*** No matter which make a-c welder you currently use, here are advantages A. O. Smith convertors offer—**

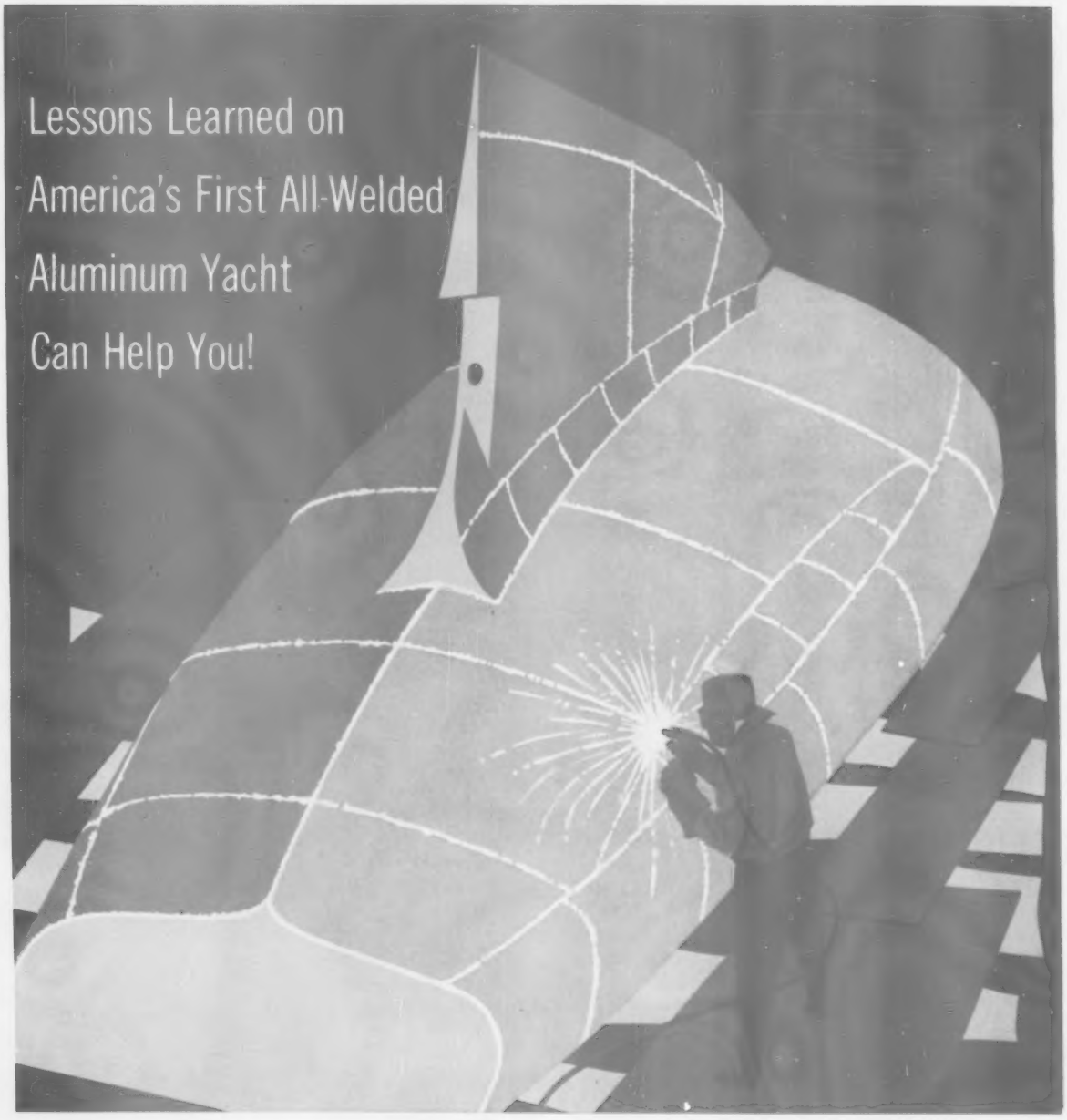
- Complete polarity switch permits fingertip selection of d-c straight, d-c reverse or a-c current without touching leads.
- 250-amp unit is rated at 60% duty cycle or 300-amps at 40% duty cycle. 450-amp unit is rated at 60% duty cycle or 500-amps at 45% duty cycle.
- Completely self-contained — not special kits designed for specific welders.
- Easily portable — can be kept in the tool crib . . . quickly delivered wherever needed.
- 60-second hook-up — two cable connections to welder output, two connections to the work.
- Internal overload protection.
- Smoothing reactor to keep ripple low, arc stable.
- Blower-cooled for maximum cooling, quiet operation.
- Long-life *silicon* rectifiers.

If you don't have an a-c welder, you're missing a lot in welding flexibility. It's time to check the line of A. O. Smith a-c welding machines: 180-1500 amps.

Through research ... *a better way*

A.O.Smith
CORPORATION
WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin
A. O. Smith International S. A., Milwaukee 1, Wisconsin, U. S. A.

Lessons Learned on America's First All-Welded Aluminum Yacht Can Help You!



The hull of *Dyna*, America's first all-welded aluminum yacht, will be exposed throughout its life to great stresses, a corrosive environment, and constant battering and vibration. To meet this challenge, Burger Boat Company, of Manitowac, Wisconsin, turned to Alcoa Alloy 5154 and the inert-gas consumable electrode welding process.

Welders at Burger Boat Company had formerly worked exclusively with steel prior to building *Dyna*, yet they had little difficulty in adapting their skills to aluminum. They found that aluminum could be welded at a faster rate than steel, and with relative freedom from warping and distortion. Further, the light weight of the aluminum sections eased handling problems and speeded assembly.

This is another example of the many exciting possibilities in welding, brazing and soldering Alcoa® Aluminum and its alloys. Get in touch with your nearest Alcoa sales office for the kind of design and welding assistance that Alcoa was able to offer Burger Boat Company. For welding materials, contact your local Alcoa distributor listed at the right. For booklets and films that show how easy it is to weld, braze and solder aluminum, write Aluminum Company of America, 1740-F Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA ALUMINUM

"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

Your Guide to the Best in Aluminum Value

Want technical help in welding, brazing or soldering aluminum? Contact your Alcoa sales office, listed under "Aluminum" in the Yellow Pages of your phone book.

For immediate delivery of Alcoa welding products, call your Alcoa outlet listed below. He carries a complete range of alloys and sizes.

ALABAMA
Birmingham
Hinkle Supply Co.

CALIFORNIA
Los Angeles
Ducommun Metals & Supply Co.
Pacific Metals Company, Ltd.
San Francisco
Pacific Metals Company, Ltd.

COLORADO
Denver
Metal Goods Corp.

CONNECTICUT
Milford
Edgcomb Steel of New England, Inc.
Windsor
Whitehead Metal Products Co., Inc.

FLORIDA
Jacksonville
The J. M. Tull Metal & Supply Co., Inc.
Miami
The J. M. Tull Metal & Supply Co., Inc.
Tampa
The J. M. Tull Metal & Supply Co., Inc.

GEORGIA
Atlanta
The J. M. Tull Metal & Supply Co., Inc.
Southern Oxygen Co.

ILLINOIS
Chicago
Machinery & Welder Corp.
Steel Sales Corp.
Moline
Machinery & Welder Corp.

KENTUCKY
Louisville
Williams and Co., Inc.

LOUISIANA
New Orleans
Metal Goods Corp.

MARYLAND
Baltimore
Southern Oxygen Co.
Whitehead Metal Products Co., Inc.
Bladensburg
Southern Oxygen Co.
Salisbury
Southern Oxygen Co.

MASSACHUSETTS
Cambridge
Whitehead Metal Products Co., Inc.

MICHIGAN
Detroit
Steel Sales Corp.

MISSOURI
Kansas City
Metal Goods Corp.
St. Louis
Metal Goods Corp.

NEW HAMPSHIRE
Nashua
Edgcomb Steel of New England, Inc.

NEW JERSEY
Harrison
Whitehead Metal Products Co., Inc.
Merchantville
Southern Oxygen Co.
Vineland
Southern Oxygen Co.

NEW YORK
Buffalo
Whitehead Metal Products Co., Inc.
New York
Southern Oxygen Co.
Whitehead Metal Products Co., Inc.
Syracuse
Brace-Mueller-Huntley, Inc.
Whitehead Metal Products Co., Inc.

NORTH CAROLINA
Asheville
Southern Oxygen Co.
Charlotte
Southern Oxygen Co.
Greensboro
Southern Oxygen Co.
Raleigh
Southern Oxygen Co.

OHIO
Cincinnati
Williams and Co., Inc.
Cleveland
Nottingham Steel & Aluminum Co.
Williams and Co., Inc.
Columbus
Williams and Co., Inc.
Toledo
Williams and Co., Inc.

OKLAHOMA
Tulsa
Metal Goods Corp.

OREGON
Portland
Pacific Metal Co.
J. E. Haseltine & Co.

PENNSYLVANIA
Philadelphia
Edgcomb Steel Co.
Southern Oxygen Co.
Whitehead Metal Products Co., Inc.
Pittsburgh
Williams and Co., Inc.
York
Southern Oxygen Co.

TENNESSEE
Kingsport
Southern Oxygen Co.
Knoxville
Southern Oxygen Co.

TEXAS
Beaumont
Big Three Welding Equip. Co.
Corpus Christi
Big Three Welding Equip. Co.
Dallas
Metal Goods Corp.
Texas Welding Supply Co.
Houston
Metal Goods Corp.
Big Three Welding Equip. Co.
San Antonio
Big Three Welding Equip. Co.

UTAH
Salt Lake City
Pacific Metals Company, Ltd.

VIRGINIA
Arlington
Southern Oxygen Co.
Charlottesville
Southern Oxygen Co.
Lynchburg
Southern Oxygen Co.
Norfolk
Southern Oxygen Co.
Richmond
Southern Oxygen Co.
Roanoke
Southern Oxygen Co.

WASHINGTON
Seattle
Pacific Metal Co.
J. E. Haseltine & Co.
Spokane
J. E. Haseltine & Co.

WEST VIRGINIA
Bluefield
Southern Oxygen Co.

WISCONSIN
Milwaukee
Machinery & Welder Corp.
Steel Sales Corp.

Always on target

Automatic control guides welding heads over any seam line

"HOLD THAT LINE" is the cry of ulcer-ridden football coaches —and formerly of welding shop foremen.

But now holding the line—the seam line—is an everyday possibility with an automatic welding head which seeks, follows and welds accurately, straight or non-straight seams.

The new automatic directional control device—called LADC and manufactured by Lewis Welding & Engineering Corp., Bedford, Ohio—was first displayed at the April AWS show in St. Louis.

According to the company, LADC offers the following advantages:

(1) It insures consistently accurate centerline positioning of automatic weld beads without operator guidance.

(2) Accurate automatic welds are possible on curved or non-straight seams without special fixturing.

(3) Made possible, too, is simple and accurate automatic welding of internal longitudinal and girth seams in cylindrical shapes. (No operator is needed to guide the head and the control compensates for misalignment, fit-up variations and roll "creep".)

(4) Time-consuming precision fixturing for locating the weld seam directly under the arc path is eliminated.

(5) Finally, it allows for less accurate fit-up without burn-through than is possible with conventional automatic welding methods.

In short, the new device cuts costs of fixturing, fit-up, alignment and operator guidance while giving improved quality through consistent machine tool accuracy in locating the weld bead on the seam's centerline.

AT the AWS show a Lewis spokesman explains the new device, which is mounted on a submerged-arc machine.

Operating from a d-c welding arc, the welding voltage develops a signal in the work piece which is picked up at the seam by an error-sensing device. Minute differences in potential are amplified and utilized to control the electro-mechanical drive mechanism on which the welding head is mounted.

Signal and drive are coupled in a manner to cause the arc to seek continually for the centerline as the head is moved over the general seam path at welding speed.

Reportedly, LADC can be used for down-hand, groove, lap or fillet welds with any conventional d-c automatic welding process—either submerged-arc or one of the inert-gas shielded arc processes (Mig or Tig).

"Enthusiastic response from all branches of the welding industry [at the St. Louis show] exceeded all expectations," stated Eugene D. White, field sales manager. "We are convinced there is an important function to be served by such a device."

ULTRASONIC WELDING *

SONOWELD®
AN IMPORTANT
NEW WELDING CONCEPT

Shown above is SONOWELD Model No. W-2000-SR-57-10, one of several sizes of units. At left below is an actual size photograph showing a .002 aluminum foil lead ultrasonically welded to an aluminum capacitor can.

Ultrasonic Welding Without Fusion

SONOWELD is a revolutionary new metal-joining technique which uses vibratory or high-frequency sonic energy to produce a solid-state metallurgical bond between similar or dissimilar metals.

It is superior to usual methods of welding in many applications. It is applicable to industrial use with metals and shapes heretofore impossible or difficult to weld.

There is no arc, spark, sputter, or contamination with SONOWELD equipment. Welding is done at relatively low temperatures, with low clamping force, negligible deformation. Joints are excellent in a wide variety of metals and metal alloys.

Write for more information. Tell us your specific welding problem or application.

SONOBOND CORPORATION
A SUBSIDIARY OF AEROPROJECTS, INCORPORATED
WEST CHESTER, PENNSYLVANIA
Manufacturers of Ultrasonic Metal-Joining Equipment
SONOWELD® • SONOBRAZE® • SONOSOLDER

*Ultrasonic welding — originated and developed by Aeroprojects Incorporated

Ingenuity defeats stumbling block

INGENUITY IS an American habit. So, when Newport News Shipbuilding & Drydock Co., Newport News, Va., was confronted with a difficult joining job on a nuclear reactor pressure vessel, its welding engineers exercised their ingenuity.

The problem: all welding had to be done from the outside of the vessel, yet the inside of the weld had to be smooth, uniform, and crevice free. The vessel's halves, when welded, would have a 60 in. ID of internally-clad, 4-in. mild steel. The cladding material was an 0.40 in. layer of type 347 stainless steel. In operation, the vessel had to hold a highly corrosive, heavy water process fluid under 2,000 psi pressure.

When faced with these requirements, engineers called to mind a consumable weld insert. Although this was orginally developed for butt welding pipe, they thought it could be adapted as a solution to their problem.

Use of the insert would require more careful joint preparation than in standard welding practices, but it also would assure a high-quality weld from the one side on which they could work.

Leaving an 0.05-in land, a 3/16-in. radius was machined at the inner surface, and the joint face turned at 20 deg for a little over an inch. The rest of the surface was cut at a 10-deg taper.

After the joint was visually inspected, the 347 stainless EB insert was tack welded around the 0.05-in. land of one of the hemispheres. This insert, manufactured by Arcos Corp., Philadelphia, is in wire form with a cross sectional appearance of a mushroom. The head of this mushroom-shaped wire was toward the sphere's interior.

The pressure vessel halves were then placed in a fixture to carefully

Really FIVE TOOLS in ONE

Yes, actually a BOYCE Centering Head replaces

- ✓ The Protractor
- ✓ The Centerhead
- ✓ The Center Punch
- ✓ The Level
- ✓ The Scale

Determines Center Line at any Degree and Measures Degree of Declivity

DIAL SET LEVEL

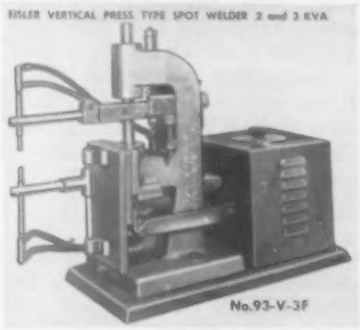
Weighs only 9 ozs. Pocket size.

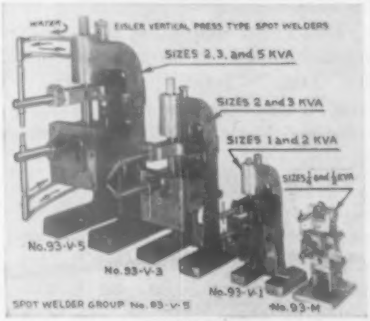
Y type head accurately machined with tangents and tips for centering and aligning. Dial Set Level in graduations of 2½ and 10 degree markings. Punch of Drill Rod with hardened point—insuring long service. Send for complete description.

CONTOUR MARKER CORP.
1843 E. Compton Bl., Compton, Cal.
Also Mfgs. of Contour Markers, Radius Markers and Pipe Flange Aligners.

BOYCE CENTERING HEAD

EISLER VERTICAL TYPE PRESS WELDERS
We also make a complete line of Spot and Wire Butt Welders.
Write for Cat. No. 93-57





EISLER ENGINEERING CO., INC.
Charles Eisler Jr., President
749 So. 13th St., Newark 3, N. J.

TOP and bottom halves were held in a fixture for easy welding and for positioning.

locate them so the insert could be tack welded to the other side of the joint. Following this, the sphere was purged and filled with inert gas to protect inner surfaces against oxidation during laying of the root pass and the subsequent two beads.

All welding was done downhand by turning the fixture to a vertical position. Tig (tungsten inert-gas) welding proceeded in 12-in. segments, approximately one-eighth of the vessel's circumference. As soon as one segment was fused, another bead was laid on it before weldors moved to the next section.

After the next segment was welded in the same manner, a third pass covered the 24 in. length, and the positioner was rotated so the opposite segments could be welded.

Once the three primary passes had been laid, the vessel was radiographed—any defects being cause for rejection. Having successfully passed this test, the unit was welded with type 347 electrodes to join the stainless steeel to within ⅛ in. of the interface of the stainless steel cladding and the mild steel where type 308L was used for five passes.

Armco iron was used for 12 passes and the remainder of the joint was welded with E7016 electrodes.

The key that unlocked the problem for engineers was the EB weld insert. Reportedly, this method produced a defect-free base unobtainable by any other process.

MATCH PSI FOR PSI

Use P&H Heat-Treatable Electrodes

Now there's a P&H heat-treatable electrode that matches exactly the carbon content of super-strong metals—responds the same way to post heat-treatment. Result: You eliminate many of the machining problems of weld repairs on castings, forgings, etc.

Low-hydrogen iron-powder coatings and special core wires minimize impurities—prevent hot and cold cracking. You get deeper, smoother penetration with less spatter and slag. Electrodes handle easily—are ideal for .25 and .40 carbon, chrome-moly, and 4130, 4140, and 4340 alloys. Get Bulletin R-48. Write to Dept. 313B, Harnischfeger Corp., Milwaukee 46, Wisconsin.

HARNISCHFEGER
MILWAUKEE 46, WISCONSIN

P&H welders • electrodes positioners

Tempilstiks°

THE CRAYONS THAT TELL TEMPERATURES

IT'S THIS SIMPLE

- Select appropriate TEMPILSTIK° for the working temperature you want.
- Mark your workpiece with it.
- The TEMPILSTIK° mark melts as soon as its temperature rating has been reached.

Accuracy within 1% of rated melting point.

Also available as TEMPILAQ° (liquid form) and TEMPIL° PELLETS

63 different temperature ratings available

For information and samples, send coupon

Tempil° CORPORATION
134 West 22nd St., New York 11, N.Y.
Send information on:

☐ TEMPILSTIK° ☐ TEMPILAQ° ☐ TEMPIL° PELLETS
☐ Send booklet "How Temperatures are Measured"
☐ Send sample pellets for _____°F temperature

Name_____
Address_____
City_____
State_____

ARE these men certified weldors? Author says No.

Who is a certified weldor?

By W. R. Stevens, *Trustee*
National Certified
Pipe Welding Bureau

CERTIFIED WELDOR? There is no such person!

Although the term *certified weldor* is freely—and loosely—used in the welding industry, it is actually a misnomer. The weldor is not certified, but manufacturers and contractors certify he is able to do a specific job according to stipulated procedures.

If this seems confusing, let us refer to section nine of the ASME Boiler and Pressure Vessel Code. This section lists welding qualifications for pipe fabrication and installations, which are generally accepted as standard by the industry.

In its appendix, the code defines welding terms; illustrates forms, copies of which must later be made for Procedure and Performance Qualification; and presents detail sketches for preparation of test samples and test jigs.

Section nine further states that persons selling welded products—manufacturers and contractors, for example—shall establish a welding method *(Qualified Procedure)* and prove that a sound weld can be made by this method. Another stipulation is that weldors employed by such manufacturers or contractors shall demonstrate their skill in making a sound weld by the method established *(Performance Qualification)*.

As an aid to those concerned, it establishes step-by-step methods for qualifying both procedure and performance.

The manufacturer or contractor must then *certify*, on a duplicate of the appendix form, that all procedures and *weldors*, who followed them, were tested according to requirements of section 9.

Paragraph P112 of the same code stipulates that if a weldor leaves the employ of one manufacturer for another, he must qualify under the latter's procedures before he is permitted to work. However, this paragraph also permits interchange of weldors among manufacturers and

This message is for men who are vitally concerned with such welding problems as maintaining a smooth flow of production... preventing excessive rejects... and insuring trouble-free, economical, profitable operation.

Welding Wire: Cost-saving and Profit Factors

Production men who are conscious of *both cost and quality* agree that a top-grade weld demands the *right* welding wire. *Only* by using wire with an analysis suited to the material to be welded can consistently sound welds—free from porosity and internal cracks—be produced. Use of the right wire means fewer rejects, less waste, lower costs—plus better performance of the finished part or product.

Experienced welding men have long found PAGE a most reliable source of welding wire for all their regular and special needs. The wide range of PAGE analyses—33 of them—makes it possible to select the exact wire that produces the kind of welds that lower production costs and increase profits.

PAGE experience, talents and facilities are available to you at all times. We have been exclusive wiremaking specialists for more than half a century, and are in an ideal position to furnish our customers with the right wire for each specific need. Furthermore, we have developed a broad packaging program which saves our customers time and money by supplying wire packaged to meet any requirement.

These factors, plus PAGE'S nationwide set-up of conveniently-located distributors, backed up by nearby PAGE warehouse stocks, help make it economical and profitable for you to standardize on PAGE Welding Wire.

PAGE offers—
33 ANALYSES
...the right analysis for your welding job

There are *33 different analyses* in the PAGE line, covering the broadest range of applications: submerged arc... inert gas ...tungsten or metal arc... oxy-acetylene gas welding.

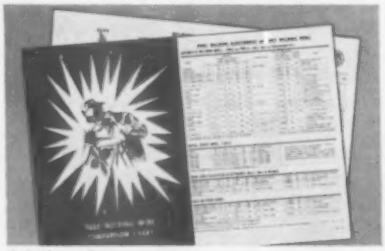
For example—

ANALYSIS A-S-8620...a balanced low alloy containing chromium, nickel and molybdenum...can be used for welding most other low alloys containing one or more of these elements. Responds to heat treatment. Can be used with inert (argon) gas, also with submerged arc flux. Widely used in welding the new T-1 steel in tank-trucks, earthmoving machinery, etc.

For example—

ANALYSIS A-S-6150...a low alloy hard facing rod. Hardness and wear-resisting properties are given by the relatively high carbon content and the presence of chrome and vanadium. Widely used in steel mills for building up rolls, in resurfacing caterpillar tractor lugs, on switch points, frogs, etc., mine car wheel rims and flanges—in fact, anywhere resistance to impact and abrasion is required.

***NOTE** • Look to PAGE, not only for automatic welding wire, but for gas welding rods, bare electrodes, metal spray wire*



***Write for*—Welding Wire Comparison Chart DH-1218-M** *(shown above)* • Submerged Arc and Inert Gas Welding Wire **Folder DH-402A** • Gas Welding Rod **Booklet DH-1277**

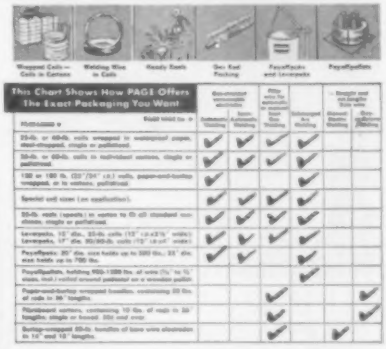
PAGE offers—
Packaging to meet your needs

PAGE Welding Wires are packaged in a wide variety of ways—for the most complete protection and the utmost convenience in handling, in stocking and in use. Here are some major types of PAGE packaging:

1. **Paper Wrapped Coils**
2. **Coils in Cartons, Palletized**
3. **Bare Coils (packed in Leverpaks)**
4. **Masonite Reels**
5. **Payoffpaks**
6. **Payoffpallets**
7. **Gas Rods in Burlap-wrapped Bundles**
8. **Stainless Gas Rods in 10-lb. Tubes**

For example—

PAYOFFPAKS...Up to 700 lbs. of wire, without a single weld...coiled around a fiberboard cylinder within a fiberboard drum...ready to be smoothly unreeled to the welding head for automatic or semi-automatic welding! Eliminates costly machine down-time for coil replacement. Payoffpaks come in three sizes: 20" diameter (holds 250 or 500 lbs.); 23" diameter (holds up to 700 lbs.)



***Write for*—PAGE Welding Wire Packaging Chart.** • This useful chart shows the many kinds of packaging of PAGE Welding Wires for each type of welding.

Now—about Delivery...
PAGE offers—
Availability from local stocks

Here is a handy service that not only gets you the welding wire you need when you need it, but saves you money by making it unnecessary for you to tie up a sizeable investment in wire inventory.

You can get the exact PAGE automatic welding wire and welding rods your job requires direct from your nearby PAGE Distributor. Located at many points from coast to coast, PAGE distributors carry sizeable stocks for your convenience—and they are backed up by PAGE Warehouses at the strategic locations shown below. Close cooperation between PAGE distributors, PAGE warehouses and the PAGE mill is your guarantee of prompt, intelligent, individual service on your specific needs.

ACCO

Page Steel and Wire Division
AMERICAN CHAIN & CABLE

Monessen, Pa.*, Atlanta, Chicago*, Denver*, Detroit, Houston* Los Angeles*, New York, Philadelphia*, Portland, Ore. San Francisco*, Bridgeport, Conn.

**Indicates PAGE warehouse stocks*

ACCO for Better Values

SPEED PLUS QUALITY!

P&H

Low-Hydrogen Iron-Powder Electrodes

Now even "difficult" steels can be welded right the first time—with P&H Iron-Powder Low-Hydrogen Electrodes. They permit faster welding in any position with little or no pre-heat.

Welds are free from cracks and porosity — possess superior X-ray quality and strength. Ideal for welding heavy sections subject to severe shock and abuse. Send for Bulletin R-29. Write Dept. 303B, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

HARNISCHFEGER

contractors who use the same qualified procedures—provided this is acceptable to the purchaser.

"Acceptable to the purchaser" brings the Board of Boiler Inspectors into the matter. This group, representing the insurance companies, insists on highest quality of workmanship and strict compliance with the code.

Thus, qualifying a procedure can be a very expensive, difficult task: particularly for the inexperienced, since qualifying is a matter of trial and error. Material cost—especially alloys—can be very high and many manhours must be expended before satisfactory results are obtained.

In order to share these expenses, over 300 contractors have joined the National Certified Pipe Welding Bureau. Since the Bureau's organization in 1944, 16 procedures have been qualified and requalified. Over 1,500 weldors have proved able to make high quality welds by these procedures for all types of piping materials in general use in the mechanical construction industry.

Contractors have thus gained general acceptance of the Board of Boiler Inspectors for interchange of weldors qualified under these procedures. The reason? The Bureau's standards exceed requirements of the code. This is done to protect its members, as each contractor is responsible for the welding done by his organization although he follows the code precisely.

Certified weldor? There is no such person!

L. M. Farber (left), vice president of Natkin & Co., and author Stevens inspect a qualified weld.

Cable Prices DOWN DOWN DOWN . . . . . .

TWECO-LITE Aluminum Welding Cable

LIST PRICE PER 1000 FEET

Cable Size	Rubber Jacket	60% Neoprene Jacket
#2	$212.00	$236.00
#1	259.00	285.00
#1/0	306.00	336.00
#2/0	370.00	409.00
#3/0	459.00	495.00
#4/0	576.00	614.00

CONSUMER QUANTITY DISCOUNTS

Less than 100′	List
100′ to 249′	List less 10%
250′ to 999′	List less 15%
1000′ to 2499′	List less 20%
2500′ to 4999′	List less 23%
5000′ and over	List less 26%

THE SIZE TO BUY FOR YOUR WORK

Maximum Amperage	Electrode Size	Cable Size to Use
100 Amps	3/32″	No. 2
150 Amps	1/8″	No. 1
200 Amps	5/32″	No. 1/0
250 Amps	3/16″	No. 2/0
300 Amps	7/32″ to 1/4″	No. 3/0
400 Amps	5/16″ Up	No. 4/0

TWECO-LITE Aluminum Welding Cable is available at your Welding Supply Distributor in precut 50′ and 100′ packages or 500′ and 1000′ reels.

Ask for Special TWECO-LITE Bulletin.

Tweco PRODUCTS, INC.

MANUFACTURERS ARC WELDING ELECTRODE HOLDERS, GROUND CLAMPS, CABLE CONNECTORS, TWECO LITE ALUMINUM WELDING CABLE

P. O. BOX 666 • Factory: Boston at Mosley
Phone Amherst 5-1684 • Wichita 1, Kansas

4 Reasons why he likes to weld in this AO CAPE SLEEVE AND BIB!

1. SECURITY

AO chrome tanned cowhide leather is selected for protective quality and wear resistance. Leather is of correct weight for maximum protection and comfort and is uniform in thickness — will withstand hard use.

2. DESIGN

The garment is designed by experts working closely with experienced welders. No excess leather anywhere to form "pockets" that might catch sparks.

3. SEAMS

No more than absolutely necessary and those are located well away from the line of fire. Are *flat* type for comfort, double thread sewed, then wire stitched for double protection.

4. FASTENERS

The finest snap type available . . . large, durable . . . easy to open and close . . . insure tight, safe closures.

208BCL — CAPE SLEEVE WITH DETACHABLE BIB

Protects arms, chest, shoulders. All seams double cotton stitched and steel sewed. Seam ends rivet reinforced. Bib attached to cape with snap fasteners and is easily replaceable. Anchor button at armpits prevents cape from unbuttoning. 5 sizes. Your nearest AO Safety Products Representative can supply you.

Put the Best on His Hands Too with Specially Tanned AO Welders' Gloves

SCTX200 GLOVE

Specially chrome tanned split cowhide. Gunn pattern, 14" overall length. Flat seam at base of palm. One-piece back lined. Wing thumb. Lightweight for working ease.

SC5X163 GLOVE

Exceptionally resistant to heat — protects on gas welding and heaviest amperage electric welding. Specially chrome tanned split cowhide. One-piece back and palm. Welted at all vulnerable seams for extra protection. Extra heavy lining on back of hand. Overall length 14".

Always insist on Trademarked Safety Products

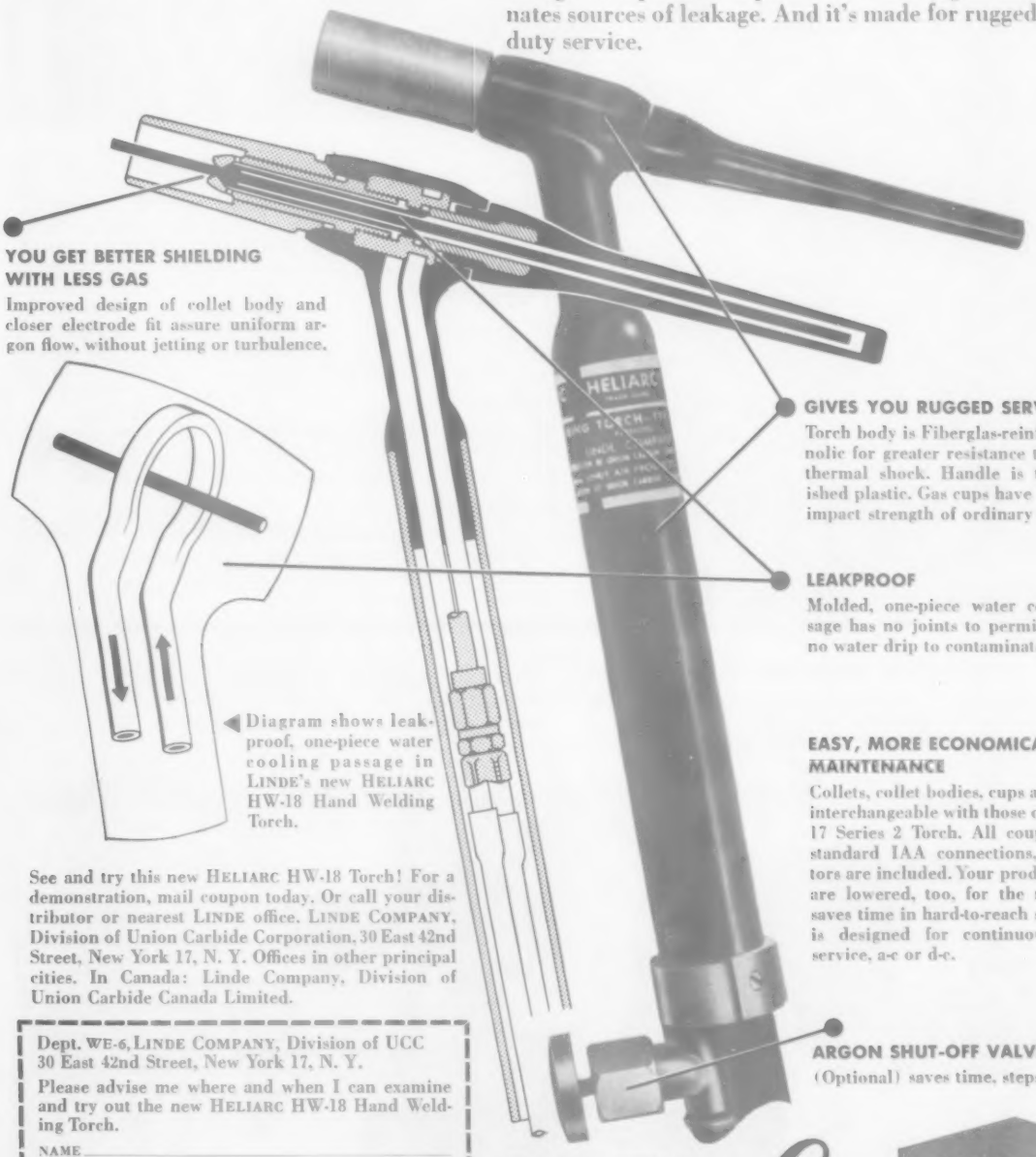
American Optical COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS
Branches in Principal Cities

1833-1958 • 125 LEADERSHIP YEARS

Here's a NEW WELDING TORCH that's WATERTIGHT... built for HEAVY-DUTY SERVICE ...yet weighs only 7 OUNCES!

This new HELIARC HW-18 Hand Welding Torch weighs only 7 ounces, making it easy for you to handle, less tiring. The special one-piece water cooling channel eliminates sources of leakage. And it's made for rugged, heavy-duty service.



YOU GET BETTER SHIELDING WITH LESS GAS

Improved design of collet body and closer electrode fit assure uniform argon flow, without jetting or turbulence.

GIVES YOU RUGGED SERVICE

Torch body is Fiberglas-reinforced phenolic for greater resistance to heat and thermal shock. Handle is tough, polished plastic. Gas cups have 4 times the impact strength of ordinary cups.

LEAKPROOF

Molded, one-piece water cooling passage has no joints to permit leakage—no water drip to contaminate welds.

◀ Diagram shows leakproof, one-piece water cooling passage in LINDE's new HELIARC HW-18 Hand Welding Torch.

EASY, MORE ECONOMICAL MAINTENANCE

Collets, collet bodies, cups and caps are interchangeable with those of your HW-17 Series 2 Torch. All couplings have standard IAA connections, and adaptors are included. Your production costs are lowered, too, for the new HW-18 saves time in hard-to-reach spots. Torch is designed for continuous 300-amp service, a-c or d-c.

ARGON SHUT-OFF VALVE

(Optional) saves time, steps and argon.

See and try this new HELIARC HW-18 Torch! For a demonstration, mail coupon today. Or call your distributor or nearest LINDE office. LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in other principal cities. In Canada: Linde Company, Division of Union Carbide Canada Limited.

Dept. WE-6, LINDE COMPANY, Division of UCC
30 East 42nd Street, New York 17, N. Y.

Please advise me where and when I can examine and try out the new HELIARC HW-18 Hand Welding Torch.

NAME _____

COMPANY _____

STREET _____

CITY _____ ZONE ____ STATE _____

FOR THE BEST IN ELECTRIC WELDING LOOK TO *Linde* TRADE-MARK

UNION CARBIDE

The terms "Linde," "Heliarc," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

Weldable titanium alloys

Nominal Chemical Analysis

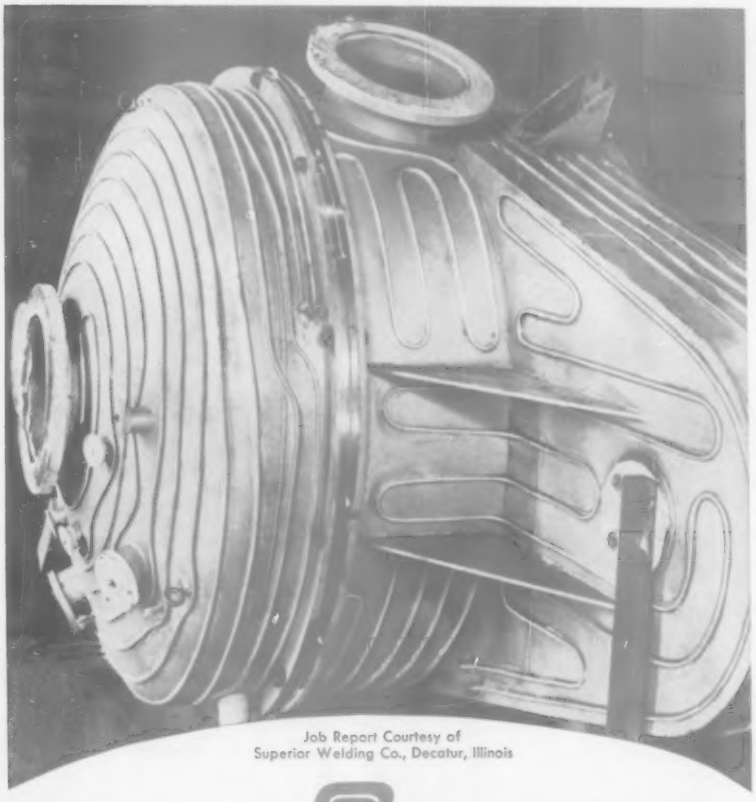
GRADE	Carbon	Nitrogen	Hydrogen		Iron	Chrome	Moly	Alum	Vanadium	Available forms*
			Sheet	Bar						
Ti-55A	0.08	0.05	0.015	0.0125	0.12	-	-	-	-	S, B, E, W, T, F
Ti-65A	0.08	0.05	0.015	0.0125	0.12	-	-	-	-	S, B, E, W, T, F
Ti-75A	0.08	0.05	0.015	0.0125	0.20	-	-	-	-	S, B, E, W, T, F
Ti-100A	0.08	0.05	0.015	0.0125	0.20	-	-	-	-	S, B, E, W, T, F
Ti-140A	0.08	0.05	0.015	0.0125	2.00	2.00	2.00	-	-	S, B, E, W, F
Ti-155A	0.08	0.05		0.0125	1.40	1.40	1.20	5.00	-	B, E, W, F
Ti-6Al-4V	0.08	0.05	0.015	0.0125	0.25	-	-	6.00	4.00	S, B, E, W, T, F

*S -- rolled flat products; e.g., sheet, strip, plate
B -- bar and billet
E -- extrusions
W -- wire
T -- tube
F -- forgings

Minimum Mechanical Properties

GRADE	Sheet & Strip		Elongation %	Bar		Elongation %
	Yield Strength	Tensile Strength	in 2 in.	Yield Str.	Tensile Str.	in 1 in.
Ti-55A	45,000	55,000	22	45,000	55,000	20
Ti-65A	55,000	65,000	20	50,000	65,000	20
Ti-75A	70,000	80,000	15	60,000	70,000	20
Ti-100A	80,000	95,000	15	70,000	80,000	15
Ti-140A	115,000	130,000	15	120,000	130,000	15
Ti-155A	140,000	150,000	12	135,000	145,000	12
Ti-6Al-4V	120,000	130,000	10	120,000	130,000	12

When stainless welds must be VACUUM TIGHT



Job Report Courtesy of
Superior Welding Co., Decatur, Illinois

WELD WITH ARCOS

STAINLESS ELECTRODES

Shown here is a stainless steel furnace body of type 304 ELC for use under very high vacuum conditions in the casting of metals where exceptional purity is required. Arcos Chromend K-LC Stainless Electrodes were used because Arcos electrodes not only assured the proper weld metal chemistry, but also the necessary soundness to insure vacuum tight welds. Save money and future problems with long-lasting Arcos-produced welds. ARCOS CORPORATION, 1500 S. 50th Street, Philadelphia 43, Pa.

H & H opens new California metal plant

RECESSION MAY BE plaguing some firms, but Handy & Harman recently demonstrated its faith in the future by opening the largest precious metals facility west of Chicago.

The plant, located in El Monte, Calif., has a total area of 25,200 sq ft—more than twice the size of the Los Angeles unit it is replacing.

For its work in processing silver, gold and platinum into sheet, strip, circles, brazing alloys, etc., H & H maintains five other plants, four of them on the East Coast. Its executive offices are in New York City.

MELT make-up man double checks the weight of a gold bar. This one weighs 502.594 Troy ounces, is worth $17,612.27.

In the new building, windowless except for offices and laboratory sections, fabrication, research, assaying and metal recovery work will be done.

Fabrication equipment includes rolling, strip and rod mills, gang slitters, wire-drawing blocks and a protective-atmosphere annealing furnace.

The laboratory is fitted to conduct research on new developments in the precious metals field, and will assay

DRAWING silver brazing alloy wire on a bull block with a diamond die. Wire is thinned from 0.064 in. to 0.045 in.

gold, platinum and silver. (*Ed. note:* The price Handy & Harman pays for silver in New York is accepted as the official market price for foreign silver throughout the Western Hemisphere.)

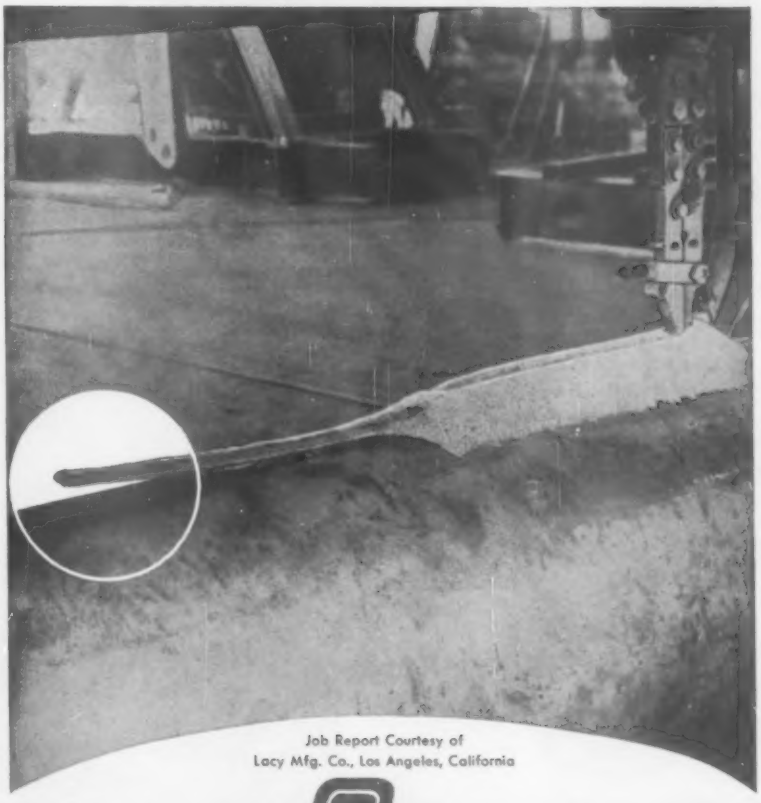
One of the most important financial aspects of the new plant is its setup for recovering precious metal residues. Herman Folgner, manager, estimates he'll have about $50,000 worth of precious metals tied up at all times in the form of smoke, sweepings and other plant waste.

One way this is recovered is with a smoke collector. Six orlon-flannel filter bags are fitted into this collector and emptied of their valuable cargo every two weeks.

A large part of the new plant's business will be conducted for the metal joining field; the El Monte plant will produce large quantities of silver brazing alloys for the welding industry.

SMOKE collector at new Handy & Harman plant saves more than $10,000 worth of gold that otherwise would be lost during processing each year.

Now, submerged arc stainless welds with slag that "pops-off"

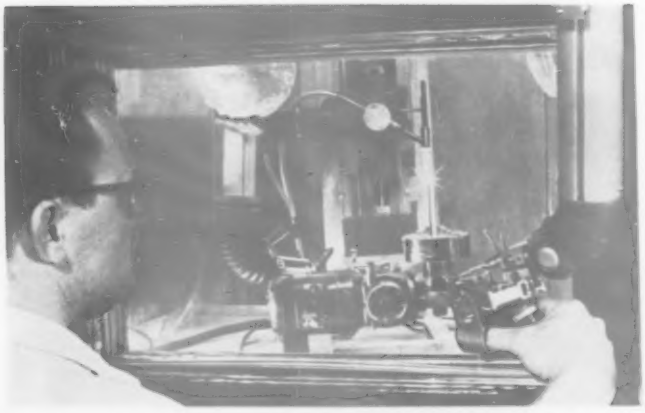


Job Report Courtesy of
Lacy Mfg. Co., Los Angeles, California

WELD WITH ARCOS

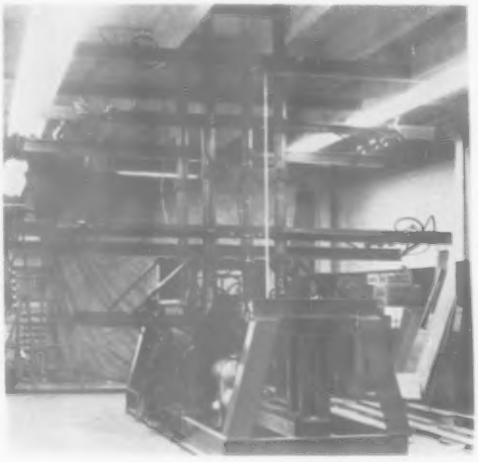
Stainless Wire and Arcosite Flux

Arcos research and experience with stainless weld metal now pays you *another dividend*—for the first time . . . consistently *self removing slag!* On the job above, submerged arc welding of a section of pipe for petroleum equipment, two passes were made with 1/8" coiled CHROMENAR KMo Stainless Wire and ARCOSITE S-4 Flux. As the photo shows, the cooling slag is lifting free by itself . . . leaving a clean, smooth bead. Think what this can mean to you on your own submerged arc welding jobs . . . saving time and money . . . better welds than ever before. ARCOS CORPORATION, 1500 S. 50th St., Philadelphia 43, Pa.



HOW would you seal 34 capsules of radioactive cobalt? Oak Ridge National Laboratory, Oak Ridge, Tenn., does it by Tig welding with Linde Co. equipment the stainless containers inside a shield cell fitted with mechanical manipulators. Both container and torch are positioned by a motor-driven positioner. Four conditions are essential to sound welds: surface must be clean; material inside containers must be dry; virtually no clearance is allowed between surfaces to be welded, and containers must be purged with inert gas before welding.

HIGH-frequency sound is used by this welder to join aluminum to aluminum, aluminum to stainless, or any two dissimilar or similar metals. Principle: ultrasonic waves cause molecular transference or plastic flow at joint interfaces—but at heat *below* melting point of either metal. Produced by Gulton Industries, Inc., Metuchen, N. J., the machine was first described in WELDING ENGINEER in March, *p. 23*. The seam welder has eight heads, four of which operate simultaneously. Self-monitoring, it continually checks itself against failure. If failure occurs, the machine automatically shuts down. Price: $15,000 and up.



On the Job . . .

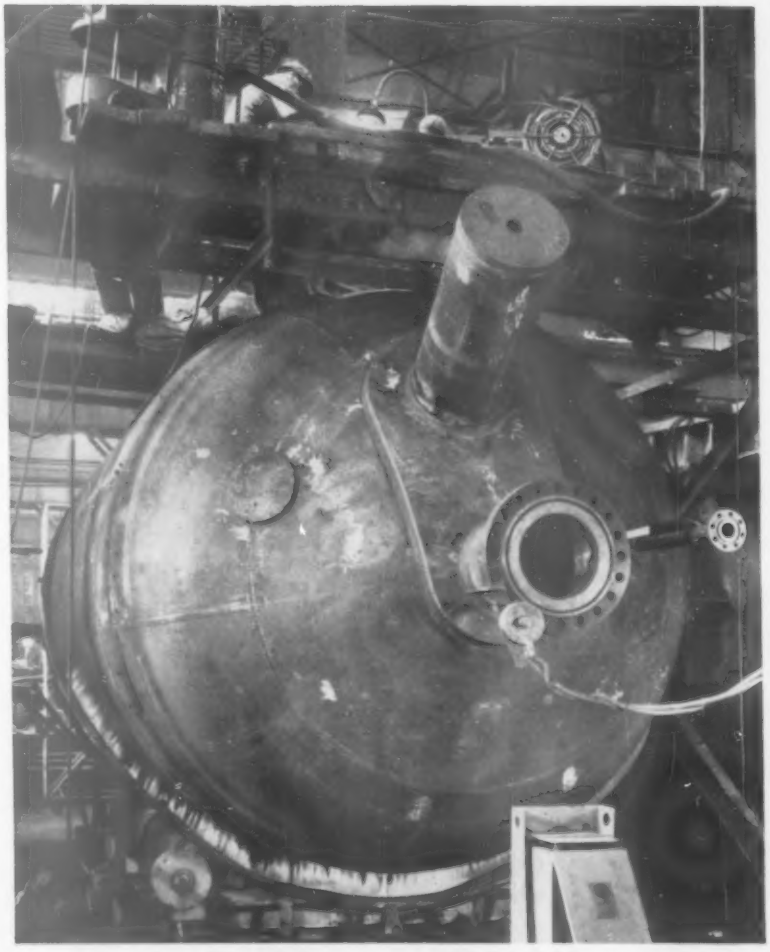
CONTRACTOR using five "Tournapull" earthmovers keeps his fleet in peak condition by bringing in one truck each hour for maintenance. In this way, he keeps up with minor troubles and usually forestalls major ones. He avoids expensive manpower loss by using only four drivers. Here a weldor works on a scraper runner rail, getting his power from a maintenance truck that is always nearby.

SPRING is here and these weldors are probably glad of it. In a photograph taken last winter, this crew joins sections on the Trans-Canada pipeline. Temperatures often dropped to —44F; averaged a comparatively balmy zero on the bare, windswept tundra. Scheduled to be finished last month, the line stretches from Alberta to eastern Canada. *For more details on the line, read WELDING ENGINEER, p. 32, July, 1957.*

For any stainless welding job

SPECIFY *Drawalloy* CORPORATION

Stainless Steel Welding Wire



Spooled for Inert Gas Shielded Metal Arc Welding

Coiled for Submerged Arc Welding

Cut Lengths for Inert Arc Welding

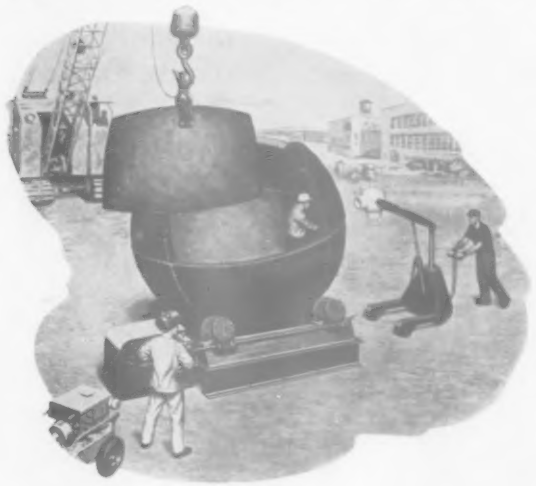
Specify Drawalloy "quality controlled" stainless steel welding wire for *your* next "quality weldments." Your greatest advantage is experience . . . our experience in producing wires for welding exclusively. Because we are specialists, Drawalloy stainless steel welding wire is produced to strictly controlled specifications to provide the right chemistry, finish and temper for the finest quality weld metal and smoother operation in your automatic or semi-automatic equipment. Drawalloy stainless wires are available in all popular grades as well as 2¼ Cr, 1 Mo; 1¼ Cr, ½ Mo.

Why not discuss your stainless welding wire needs with your Drawalloy Distributor or Representative . . . a man with the products and knowledge to help you. Bulletin 355 DC provides complete information on every grade of Drawalloy wire. Write to: Drawalloy Corporation, Lincoln Highway West at Alloy Street, York 12, Penna.

DRAWALLOY
CORPORATION
YORK, PENNSYLVANIA

THE WIRE MILL FOR THE WELDING INDUSTRY — STAINLESS STEEL · TOOL STEEL

new products . . . . . Use card on page 105



HEAVY steel castings, weldments and other steel products up to 10 in. thick can be radiographed with this "Cyclops 60."

Radiographic unit

FOR less than $20,000, the "Cyclops 60" unit radiographs heavy steel castings, weldments and other steel products up to 10 in. thick with 1% and 2% sensitivity. It can radiograph 6 in. of steel in 15 minutes, 5 in. in 6 minutes, 2 in. in ½ minute, etc. The Cyclops radiates energy equivalent to the 2- to 3-million volt x-rays needed to penetrate welded seams, elbows, etc. Remote control opens a shutter to let out radiation. Steel-jacketed lead sphere is flexibly mounted so beam can be aimed in any direction. Unit moves to the job. *Picker X-Ray Corp.*

Circle No. 1

Electrode holders

TWO new models of the "Tong-grip" line of electrode holders feature cable insulation anchor pin which prevents cable insulation from slipping. With no exposed strands, cables will not break from exposure and overheat, maker says.

One holder is 300 amp made with a special aluminum alloy lower tong permanently bonded to copper alloy jaw inserts. No screws or bolts are used in the lower tong.

The 300 amp holder has replaceable copper jaw inserts. Lower tong is copper alloy and silver brazed to copper jaw inserts. *Martin Wells Co.*

Circle No. 2

Steel abrasive

STEEL blast cleaning abrasive has a narrow hardness range. New abrasive is shotted, then goes through its first and only continuous heat treat in a controlled atmosphere. The almost scale-free shot possesses a narrower range of hardness than most abrasives, manufacturer says. *Pangborn Corp.*

Circle No. 3

NEW
ARO Model 410
Air operated gun with "Ski-lift" type gyro suspension
ARO
Portable
SPOT WELDERS
with "SKI LIFT" type
gyro suspension
• Automatic timing
• Usually costs about half as much as gun-plus-transformer
• Works on existing power lines
• No power loss. Transformer built-in
• Handy, maneuverable—no heavy, unwieldly cables
Illustrated Literature on Request

ARO SPOT WELDERS DIVISION OF GUTHERY MACHINE TOOL CORPORATION

38-31 CRESCENT STREET LONG ISLAND CITY 1, NEW YORK

Represented in Most Major Cities

Pure Nickel inner shell of 600-gallon steam jacketed kettle welded with Inco "61"* Nickel Filler Wire using consumable inert gas metal arc process and double "V" butt type welds. Fabricated by Toronto Coppersmithing Company, Limited, Toronto, Ontario.

For inert gas welding of high nickel alloys simplify your job with *specific* Inco wires

Choose from this full line of wires and rods:

For Monel* nickel-copper alloy—use Inco "60" Monel Filler Wire and Rod

For Inconel* nickel-chromium alloy—use Inco "62" Inconel Filler Wire and Rod

For "K" Monel* age-hardenable nickel-copper alloy—use Inco "64" "K" Monel Filler Wire and Rod

For Inconel "X"* age-hardenable nickel-chromium alloy—use Inco "69" Inconel "X" Filler Wire and Rod

For Nimonic nickel-chromium alloys—use Inco Nimonic* Filler Wire and Rod

For 70/30, 80/20, 90/10 copper-nickel—use Inco "67"* 70/30 Copper-Nickel Filler Wire and Rod

Inco "Sixty" series filler wires are produced in three diameters: .035", .045", and .062" and supplied on disposable spools for the consumable electrode process. "Sixty" series rods are produced in five diameters: 1/16", 3/32", 1/8", 5/32", and 3/16" and supplied in 36-inch cut lengths for the tungsten electrode process.

For a complete list of Inco welding products including specification data and recommended uses, write:

*Trademarks of The International Nickel Company, Inc.

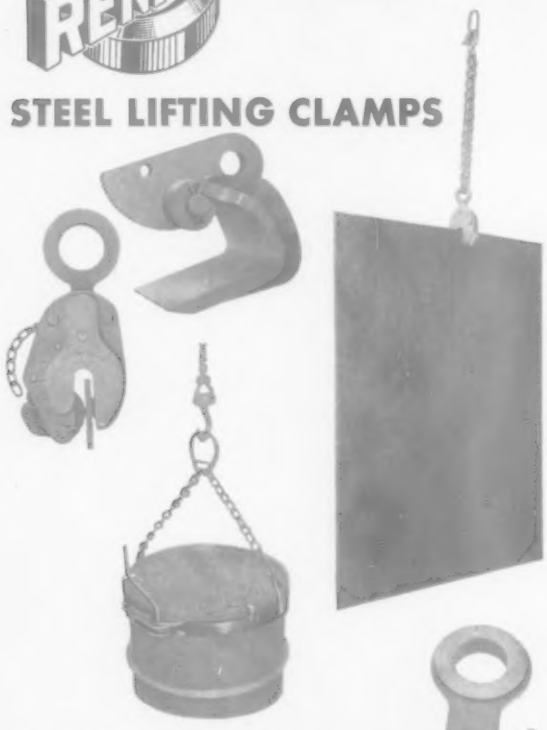
The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.

INCO **Welding Products**
Electrodes • Wires • Fluxes

And remember: when you buy **Inco Nickel** you also get **Inco+Services.** Among them are included Fabrication Help, Field Information Centers, Convenient Sales & Corrosion Service and Technical Publications.

RENFROE Safety Snap Lock

STEEL LIFTING CLAMPS



HANDLE STEEL WITH SAFETY

√ Maximum Speed and Safety
√ From ½ ton to 20 ton sizes
√ Lock on in any position
√ Lock off in any position
√ Exceptionally light in weight
√ The toughest clamp ever built
√ Takes the place of welded pad eyes and screw clamps
√ Cannot be accidentally knocked off
√ Safety Factor 5 to 1

A Superior Line of Steel Lifting Clamps designed to meet today's demand for handling steel with maximum SAFETY and EFFICIENCY.

WRITE FOR COMPLETE CATALOGUE

J. C. RENFROE & SONS, INC.
1259 WEST STATE STREET • P. O. BOX 4279
JACKSONVILLE, FLORIDA

Converters

ANY a-c welder can be converted to d-c output with one of two new portable converters. One unit is designed for conversion to d-c output of up to 250 amp; another converts to d-c output up to 450 amp. Each converter is portable, self-contained and can be placed on top of an a-c welder. Only two connections required. Convertors, manufactured with silicon rectifiers, have full 60% duty cycle industrial rating. They are internally protected against overload and blower cooled. Smoothing reactor provides low ripple for arc stability. *A. O. Smith Corp.*

Circle No. 4

Cutting machine

ACCURATE work is provided by new oxygen cutting machine used in edge preparation on plate fabrication using automatic welding processes. Oxygen planers have torch suspension system that assures alignment of torches and is able to follow variations in plate surfaces, manufacturer says.

The machine is a low-gantry-type structure which spans the width and runs along the length of plate on tracks. Besides torch combinations spaced to give parallel cuts, an auxiliary torch carriage runs transversely to make cut at right angles to length of plate.

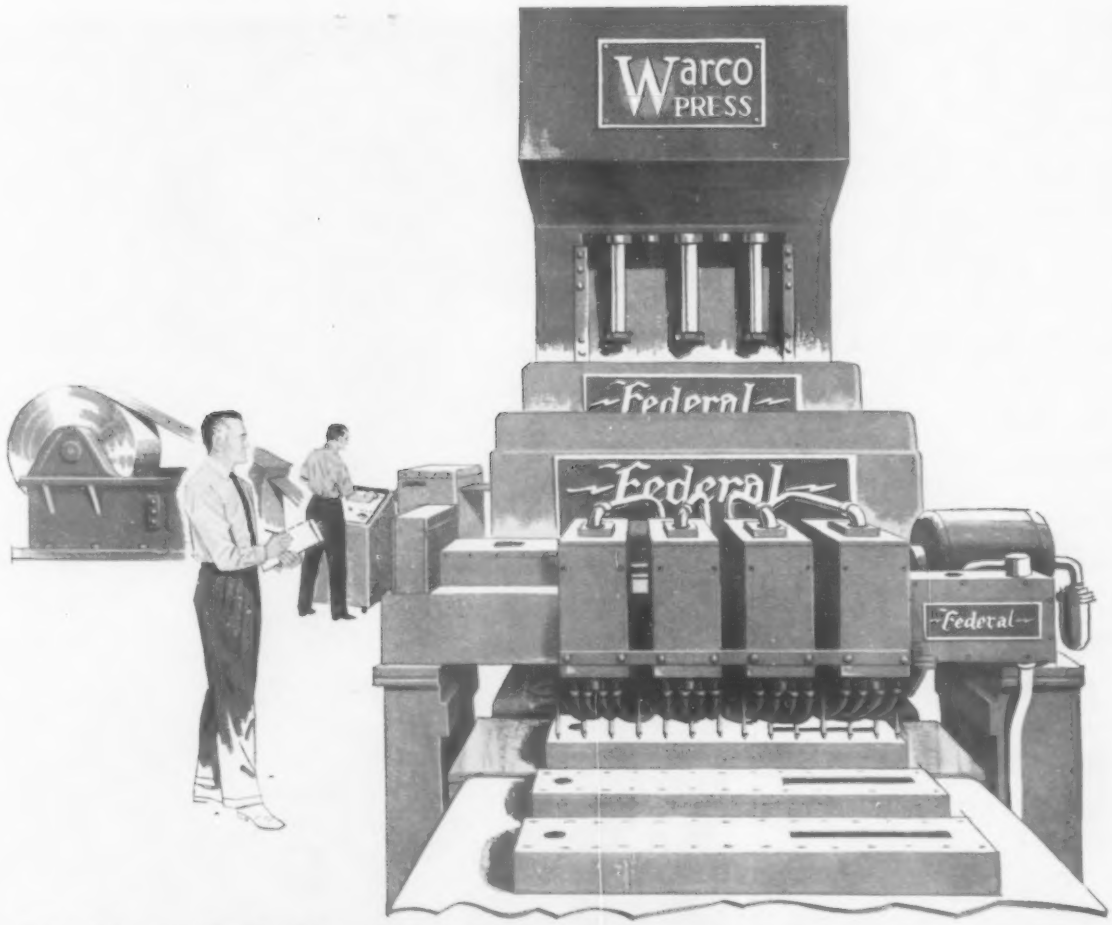
Three-phase motor drives the machine; variable speed ranges from 3½ to 32 ipm. Torches ride on plate to maintain contant distance from work. *American Messer Corp.*

Circle No. 5

Ceramic parts

MINIATURE precision ceramic parts held to micro-thousandth tolerances are made of a product heat resistant to 1,060 C. Applications include induction heating fixtures, spot welding tools, furnace brazing plates, welding nozzles, etc. *Duramic Products, Inc.*

Circle No. 6



NEW LOOK IN PRODUCTION LINES

From Material to Product in ONE PACKAGE

Need help to reduce your manufacturing costs and raise your production? Why not check Federal/Warco Packaged Production Lines – automated production from coil strip or sheet blanks to finished product.

Only Federal can offer you actual single source responsibility with major line components of resistance welders, punch presses, mechanical welder presses, automatic arc welders, expanders, destackers, transfer equipment and digital control – all designed and built in Federal's plants.

Federal pioneered and are leading designers and builders of packaged lines. Talk with a Federal representative when next you're planning production welding or press equipment.

Federal / Warco
PACKAGED
PRODUCTION LINES

THE FEDERAL MACHINE AND WELDER COMPANY - WARREN, OHIO

AFFILIATED WITH BERKELEY-DAVIS, INC., DANVILLE, ILLINOIS, MANUFACTURERS OF AUTOMATIC ARC WELDING EQUIPMENT.

Shear attachments

Two new attachments for a pipe, bar and angle iron bender include a shear attachment useful when flats are cut. Blades are adjustable and interchangeable, of high grade tool steel hardened for cutting hot rolled mild steel or its equivalent. Capacities are 3/8 in. by 2 in. flats and 1/2 in. round or square stock.

Punch attachment is ideal as utility punch for short run jobs, manufacturer says. Set of dies is furnished with each attachment, in sizes from 3/16 through 9/16 in. *Hossfeld Mfg. Co.*

Circle No. 7

Safety goggles

On the job, with the workmen, is where a new goggle cleaning station is installed. Only 7½ in. wide, 5 in. high and 5 in. deep, the station can be mounted on wall or machine. It is aluminum and polyethylene and contains a four-oz. squeeze bottle of "Fogpruf" and package of 200 tissues. Much of value of station is in its convenience. *Mine Safety Appliances Co.*

Circle No. 8

Cutting tool

For a long time oscillating abrasive cutting machines have been restricted to a movement forward and back over a limited arc—limited in most instances by the throw of a cam or yoke. Unique new machine, the "See-Saw" can travel over a set distance steadily, or intermittently, at any desired frequency or reciprocation.

Machine is powered by three separate motors. One rotates the cutting wheel, another powers forward and back travel of the cutting head and a third supplies more than 35 gal of cutting compound to the cutting area. Cutting area is 9 by 18 in. Tool can cut wet with rubber bonded wheels or dry with resinoid bonded wheel. Main motor is 20 hp. Squares or miters can be cut with the 26 in. diameter wheel. *Wallace Supplies Mfg. Co.*

Circle No. 9

NOW, A MANGANESE STEEL ELECTRODE
with High Build-up, Low-spatter, Easy Slag Removal

A special new Amsco rod, Nicro-Mang, for both joining and buildup of manganese steel

Out of Amsco® metallurgical research has come a new welding rod that gives you high weld strength without cracking on Austenitic manganese steel. A rod that lets you lay down a bead without slag popping, and slag removal is easy.

To lick the cracking problem, it took a special alloy of chromium and nickel, plus a unique coating for Nicro-Mang.

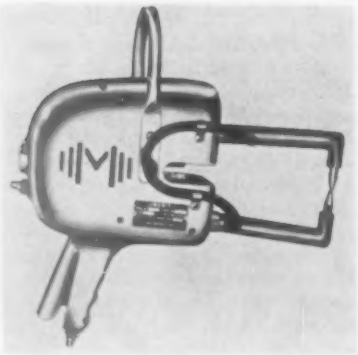
Write for Nicro-Mang bulletin, or see your local Amsco distributor.

Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Illinois



Spot welder

PORTABLE spot welder, the "Merit might midget," features an electronic timer and contactor. It welds up to 3/16-in. combined thickness. By a linkage device, tip pressure can be varied from zero to 1,000 lb. in seconds. Both air-cooled model 150 and water-cooled model 155 have the following specifications: 60 amp, 210-240 volts; throat depth, 11 in.; maximum tip opening, 4 in.; width, 4⅝ in.; height, 8⅝ in.; overall length, 18½ in. *The Merit Co.*

Circle No. 10

Plastic welding

HIGH speed plastic welder is fitted with standard welding tip or high speed tacking tip to permit rodless tacking. Tip is simply moved along the seam and fuses edges strongly enough so that large sheets can be lifted and moved around without coming apart. With the addition of a flat tip, V-tip and strip feeder, the model "HT" welder can be used to heat-seal vinyl strip on plasticized vinyl tank linings, etc. Model "HS" has special high speed tips for ⅛, 5/32 and 3/16 in. rod that hold, feed and guide rod automatically. Both welders are made of stainless steel, handles are air-cooled and electrically insulated. Air temperature is regulated by adjusting valve connected to pressure gage. *Laramy Products Co.*

Circle No. 11

Ultrasonic cleaning

DESIGNED for portability, a new ultrasonic cleaning unit consists of a generator and a corrosion resistant tank made of 18-8 heavy gage stainless steel. The generator is 10 in. high, 7 in. wide and 10½ in. deep. The tank is 9 in. high, 5¾ in. wide and 5¾ in. deep. It has more than one half gallon cleaning capacity. The lightweight (25 lb) tank can be bench recessed or flush mounted. *Acoustica Associates, Inc.*

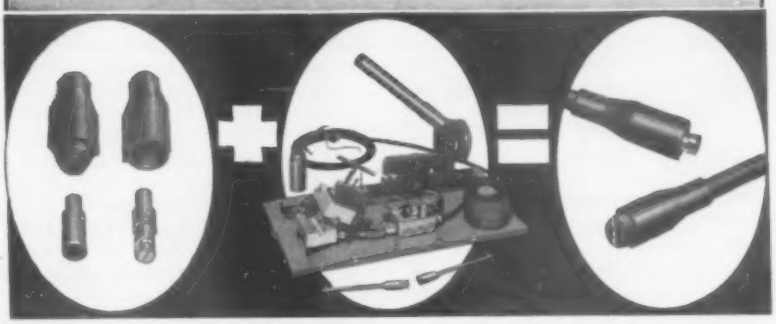
Circle No. 12

cam-lok

neoprene insulated

CABLE CONNECTORS

. . . the smoothest connection you can make!



Tapered and Vulcanized . . . Trouble-Free

No more bulky cable connections to "foul up" on obstructions and delay production. Now you can make shockproof, waterproof cable connections in your own plant in minutes with a 110 volt portable Vulcanizing Kit. Seals prefabricated neoprene insulating sleeves to cable jackets . . . cable breakage at connector is eliminated . . . cable jackets cannot pull away. Connectors lock tight—stay tight! Join all cable sizes instantly without adaptors.

Write for free catalog and see how simple, convenient and foolproof these connectors are to use. Vulcanizing Kit can also be used with an adaptor mold to make neoprene insulated, waterproof *Cable Splices!*

cam-lok DIVISION

EMPIRE PRODUCTS, INC.
P. O. BOX N-98 CINCINNATI 36, OHIO

Electrode

SPOOLED electrode "NCG 111-A" adds "multipass versatility" to the firm's carbon-dioxide welding process. Meeting requirements for both multiple and single-pass welding of pressure vessels under ASM-AWS and ASME codes, product is a flux-cored electrode that successfully welds all carbon steels up to 0.35% carbon content, and AS212 type steel. It is used for single-pass welding of attachments to tubing steam systems of power plant equipment. Welds joining nozzles to pressure vessels are 2 to 6 in. thick, taking up to 200 lb of weld metal per joint. *National Cylinder Gas Co.*

Circle No. 13

Grinder

AERIAL-type grinder is fitted with grinding wheel and guard. For use with high-speed cutting wheels, the grinder comes in two models—6 in. and 5 in. wheel diameters, 1½ and 2 hp, 7,000 rpm. *The Nedco Co.*

Circle No. 14

Ground clamps

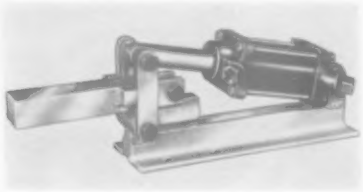
LINE of arc welding ground clamps is equipped with ball-point type cable connections which make it possible for a weldor to attach clamp to cable in less than two minutes, manufacturer says. Cable socket is drilled in clamp casting; at right angles to this socket another hole is drilled and tapped. Both holes are 9/16 in. A cadmium plated ball-point steel screw goes in the tapped hole. To install a clamp, simply strip 1 in. of cable jacket, insert bare cable in socket and tighten the screw down directly on cable strands. *Tweco Products, Inc.*

Circle No. 15

Gas mixtures

FOR flat position aluminum welding, a 3% chlorine in argon gas mixture is available, and for vertical and overhead welding (using Kaiser Qualiweld Process), 3% chlorine in helium can be obtained. A regulator built to withstand corrosion by chlorine is also available. Where more than one pass is needed in heavy-plate welding of aluminum or magnesium alloys, the chlorine-inert gas mixtures eliminate porosity. *The Matheson Co., Inc.*

Circle No. 16



Clamps

SERIES of heavy-duty, air-operated clamps are in the 800-lb classification. Three models are available—for conventional holding operations and difficult mounting situations, (as when the cylinder interferes with conventional clamping.) *Lapeer Mfg. Co.*

Circle No. 17

This on-the-job test reports:

"Cooler . . . lasts 3 times as long"

Spot Welder No. 89

Service Welder No. 199

Welder's Mitten No. 98

Riegel

WELDER'S GLOVES

"The Riegel No. 99 Heavy Welder lasts six weeks against two weeks for the glove we used formerly. The men tell us it's more comfortable and cooler."

So reports Mr. Richard Thornell, whose switch to Riegel now saves $35.00 yearly per man at Oliver Corporation, Springfield, Ohio.

No. 99 facts: Heavy but flexible "flextan" welders' leather, gunn cut, wing thumb. Extra roomy, extra long. One-piece back, wool-insulated . . . all exposed seams welted . . . full protection against heat and sparks.

Riegel has the service you want, too . . . industrial specialists to help select the right style . . . eight warehouses to speed delivery. Write or phone today.

INDUSTRIAL GLOVE SALES

RIEGEL TEXTILE CORPORATION

CONOVER, N. C.

Sales Offices in:
Birmingham • Chicago
Detroit • Los Angeles
New York City

Riegel
GLOVES THAT WEAR ON WHERE OTHERS WEAR OUT

Warehouses in:
Chicago • Conover, N. C.
Detroit • Greenville, Ala.
Los Angeles
New York (Paterson, N. J.)
Oklahoma City
Portland, Ore.

Radiochemical service

THROUGH a new "EQ Pak," radiochemicals can be purchased without the delays of licensing procedure. The Paks are quantities of radio-carbon compounds which are AEC license-exempt. All Paks contain 50 microcuries of Carbon-14 compounds, the quantity established by the AEC as the maximum Carbon-14 activity any material may contain without AEC authorization for its sale and possession. Up to 10 packages may be possessed at one time, but combination of several packages to form an aggregate amount over 50 microcuries is forbidden. The Paks may be used in most tracer experiments. *Nuclear Sales Dept., Tracerlab, Inc.*

Circle No. 18

Power rectifiers

HERMETICALLY-sealed, all-welded silicon power rectifiers for industrial applications have optional mounting bases and reverse polarity types in all ratings and mounting styles. Series is rated at 45 to 150 amp with ratings from 50 to 800 volts. Applications include welding equipment, etc. *International Rectifier Corp.*

Circle No. 19

Drill positioner

LARGE weldments for drilling and milling operations on large turbine rings can be positioned on a new drill positioner. With 6,000-lb capacity, rated at 5 in. overhang, 22 in. eccentricity, positioner has a table 7 ft. 4 in. in diameter, machined with T slots. It is designed to withstand a 1,000-lb drill force at edge of table in any direction. Special features include two-speed tilt and rotation drives, powerized horizontal movement of positioner on machined ways, allowing 36 in. of travel, manual shot pin locators on table, rotation with friction brake for intermediate positions, scale to mark table in degrees and protractor to register degrees of tilt. All controls are the pushbutton type mounted on pendant station. *Pandjiris Weldment Co.*

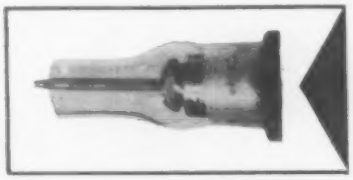
Circle No. 20

NOTHING EVEN COMES CLOSE

TO THE AMAZING

TEC VISUWELD® TORCH!

The TEC VISUWELD water cooled torch is the talk of the Industry because it's the ONLY torch to combine ALL these exclusive features for outstanding TUNGSTEN INERT GAS WELDING.

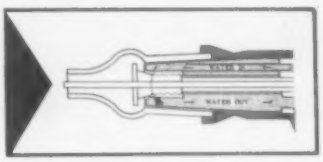


***ORIGINAL* VISUWELD TRANSPARENT GAS NOZZLE . . . YOU SEE WHAT YOU WELD!**

An unrestricted view of the weld while welding with durable, fog-free Quartz, Vycor or Pyrex nozzles.

***EXCLUSIVE* "TIP-OF-TORCH" COOLING FOR COOLER OPERATION! . . .**

Cooling system design affords continuous coolant water to reach tip of the torch. No need for "cooling off time" even at 350 amps.



PLUS THESE AND OTHER FEATURES:

***GUARANTEED* GAS AND WATER LEAKPROOF! . . .**

One-piece unit torch head with NO fittings or gaskets allowing NO water or gas to escape.

***LIGHTEST* WEIGHT TORCH... ONLY 3 OUNCES!**

Three ounces of working weight and an inch of diameter mean easy handling, faster fatigue-free operation.

3 TORCHES IN ONE! . . .

Weld efficiently, continuously from 3 to 350 Amps. . . . AC or DC. No need to change torches.

NO MAINTENANCE PROBLEMS! . . .

One-piece construction coupled with durable materials eliminate parts wearing out. No replacements are required.

Write NOW for full information on the TEC Visuweld Torch and Other Superior Visuweld Equipment

TEC TORCH CO., INC. 300 PATERSON AVENUE CARLSTADT, NEW JERSEY

"...complete satisfaction..."

with Norris-Thermador ACETYLENE CYLINDERS

Kansas Oxygen, Inc.

"For the past ten years we have purchased and are now using many Norris-Thermador Acetylene Cylinders. They have performed to our complete satisfaction in every respect."

S. F. Robertson, Kansas Oxygen, Inc.

Kansas Oxygen, Inc., plants and warehouse located in Hutchinson, Kansas. Distribution throughout Kansas.

you, too, can count on "complete satisfaction"...

with Norris-Thermador Acetylene Cylinders. Norris-Thermador is the only independent manufacturer of the *complete* acetylene cylinder. This places extra demands for uncompromising quality on the manufacturer, because full responsibility lies with him. Norris-Thermador welcomes this responsibility and stands squarely behind every acetylene cylinder it produces. Write or wire for specifications on all sizes from 10 to 300 feet capacity. Cable: Northerm.

SEVEN LEAGUES AHEAD IN THE SCIENCE OF ACETYLENE CYLINDERS

NORRIS-THERMADOR CORPORATION

5215 SOUTH BOYLE AVENUE, LOS ANGELES 58, CALIFORNIA

Sintering furnace

CARBIDE sintering furnace loads from the bottom. A platform swings out for fast loading, then swings back beneath the furnace. At that point, a hydraulic lift goes into action, carrying the material up and into the furnace. This type furnace can be operated at temperatures upward of 2,500 C. *Ajax Electrothermic Corp.*

Circle No. 21

Flame cutter

IRREGULAR shaped machine or weldment parts can be cut of steel plate with a new flame-cutting machine. A readily prepared template of masonite or sheet metal guides the machine cutting torch. Used for cutting steel plate from ¼ to 2 in. thick, average cutting rates of 24 ipm and 10 ipm can be achieved, respectively. Tracing head is driven by a variable speed gear head motor, designed to cover a wide range of cutting speeds. Torch-cutting equipment for use with either natural gas, propane or acetylene can be supplied. *Speedi-Burn Products Co., Inc.*

Circle No. 22

Cut-off machine

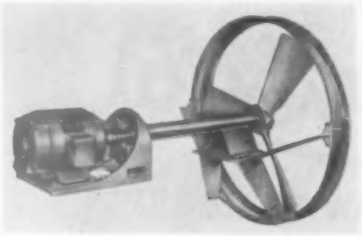
MATERIAL can be stored and feed-stop clamped with a new automatically-fed swing cut-off machine. Clamping is done by air as the operator swings the cutting head into position. Capacities to 1.9 in. round tube or pipe, 12 or 14 in. wheel may be used. Either ferrous material cut with abrasives, or non-ferrous materials cut with metal wheel and mist coolant system may be worked with this unit. *Wallace Supplies Mfg. Co.*

Circle No. 23

Boom truck

TELESCOPIC action positions work loads on a new "Hydro-boom" truck. Accuracy to within 1/100 in. in vertical, longitudinal and cross-wise directions of travel is accomplished with the new truck, manufacturer says. Hook reaches to 48 in. beyond front end of truck, capacity at maximum boom extension is 1,500 lb, with boom retracted, 2,500 lb. Available in hand-operated or battery-operated models with or without power propulsion. *Vanguard Engineering Co.*

Circle No. 24



Shaft fans

CONTAMINATED fumes from hoods can be removed with a new axial flow extension shaft fan. For corrosive exhaust, special corrosion resistant coatings are applied to fan and extension tube. The type "CE" fans are non-overloading, thus suitable for use over an operating range from free air to 1½ in. static pressure. Propellers are modern airfoil type of cast aluminum magnesium alloy. Drive shaft and bearing assemblies are oversized for long life. Bearings are sealed and prelubricated with high temperature silicone grease. Available in nine diameters to 60 in., the new fans have air deliveries to 79,000 cu ft/min. Extension shaft lengths from 16 to 66 in. are available. *Propellair Div. of Robbins & Myers, Inc.*

Circle No. 25

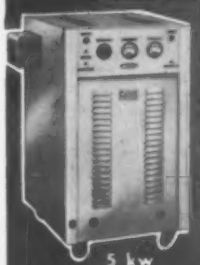
Ultrasonic cleaners

MASS-produced line of high-capacity, production-size ultrasonic cleaners, metal-finishing and chemical processing machines are available. Series 600 comprises 13 different ultrasonic systems of combinations of generator and transducer models "NT-601" to "NT-609". Stainless steel tanks in this series range from ½ to 1 gal capacity with single or double tank compartments. Models "NT-604" and "NT-605" are hermetically sealed in leak-proof Tig welded stainless steel cases for use in solvent degreasing tanks, metal-finishing, metal-washing and heavy-duty cleaning tanks. *Narda Ultrasonics Corp.*

Circle No. 26

LOW COST! VERSATILE!

INDUCTION HEATERS



For
★ BRAZING
★ SOLDERING
★ HARDENING
★ ANNEALING
★ BOMBARDING
★ MELTING

by SCIENTIFIC ELECTRIC

PIONEERS OF HIGH FREQUENCY EQUIPMENT SINCE 1921

UNITS AVAILABLE FROM 2 KW TO 200 KW

Consultations and FREE Demonstrations on Request

SCIENTIFIC ELECTRIC

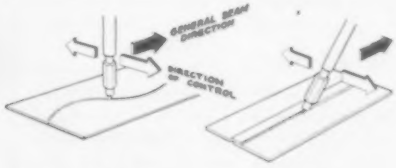
105 MONROE ST., GARFIELD, N. J.

8101-LWE

New concept in fully automatic welding creates savings in labor, tooling and set-up costs because . . .

Electronic Device Tracks Weld Seams Automatically

Automatic D.C. welding heads almost think for themselves when harnessed to a newly developed seam tracing device. This extraordinary self-guidance system makes *fully automatic welding possible for the first time.* LADC (Lewis Automatic Directional Control) seeks, follows and welds accurately on straight, curved or irregular seams. Its two-directional action maintains constant weld seam centerline positioning without operator guidance.



2-Directional movement keeps head centered on seams.

LADC welding random curved seam in ⅜" mild steel (submerged arc).

When used in conjunction with specially adapted Lewis head manipulators, LADC simplifies automatic welding operations . . . reduces labor and errors to minimum. This versatile control device eliminates special tooling and time-consuming set-up or alignment. It can be used for down-hand butt, groove, lap or fillet welds, and is especially effective for internal welds in cylindrical fabrications.

For complete details and prices, write today or call BEdford 2-2500. **The Lewis Welding & Engineering Corp., 111 Northfield Road, Bedford, Ohio.**

Press brake

SIX-ft hydraulically operated press brake with an adjustable stroke is for light gage sheet forming and fabricating operations. Model 20-72 features "stroke adjustment" which enables the operator to have complete control over ram during forming and punching. Ram of the brake is mechanically linked to a cam shaft which is turned by power applied to a rotary hydraulic cylinder. Oscillating action of the cylinder has a maximum movement of 270 deg.

An adjustable relief valve can be preset to apply required tonnage to bend low ductile material without fracturing. A back gage is adjustable both vertically and horizontally. *O'Neil-Irwin Mfg. Co.*

Circle No. 27

Weld torch

COOLING water passages are molded in the torch head giving a new hand welding torch, the "HW-18," complete freedom from leakage. The torch body is made of fiberglass-reinforced phenolic with exceptional heat resistance, says the manufacturer. New gas cups for the torch have improved thermal shock and heat resistance, with impact strength reportedly four times greater than the ceramic cup. Metal sleeved cups are available for exceptionally hard use. Torch weighs 7 oz. Optional shut-off valve on handle conserves gas, besides saving steps. *Linde Co.*

Circle No. 28

Speed drives

"ANY-Speed" drives give precise rotary and lateral welding 30 ft long and 15 ft in diameter, manufacturer says. Steel pressure vessels from 3 to 15 ft in diameter and up to 30 ft long can be welded, using the drive with its electro-hydraulic remote control system. Accurate lateral welding of plate seam is made at feeds from 0 to 50 ipm and cycle time is cut by traversing at speeds up to 150 ipm. *The Oilgear Co.*

Circle No. 29

PUROX
TRADE-MARK

Oxy-Acetylene Welding and Cutting Equipment...made by LINDE

For more than 50 years, LINDE products for oxy-acetylene welding and cutting have been earning their reputation for good workmanship. In PUROX Equipment, you get the high quality always associated with the LINDE name.

Free!

NEW CATALOG OF "PUROX" WELDING AND CUTTING EQUIPMENT

The PUROX line is a *complete* line, sold only through LINDE's carefully selected distributors and jobbers. In every part of the country, there's a source of PUROX Equipment. Write today for your copy of the latest catalog.

PUROX { Welding and Cutting Outfits • Portable Machine Carriages • Blowpipes • Welding and Heating Heads • Cutting Attachments Cutting Nozzles • Regulators • Accessories and Supplies

Linde TRADE-MARK — UNION CARBIDE

USE THIS COUPON FOR YOUR "PUROX" WELDING AND CUTTING EQUIPMENT CATALOG

LINDE COMPANY, *Division of Union Carbide Corporation*, 30 East 42nd St., New York 17, N.Y.

Please send me a free copy of the catalog, "PUROX Oxy-Acetylene Welding and Cutting Equipment."

NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

The terms "Linde," "Purox," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

PREST-O-LITE
Trade-Mark
Air-Acetylene Outfits . . .

Job-Matched to fit your needs

The wide variety of standard PREST-O-LITE outfits available meets almost every soldering, heating, and brazing need. If your job is "out-of-the-ordinary," you can easily make up your own special outfit to meet your exact requirements.

Simply select the torch handle, stems, and accessories you need. Buy *only* what you need, *when* you need it —no "extras." Remember, every PREST-O-LITE stem fits interchangeably on all PREST-O-LITE torch handles. Change-over takes only an instant.

Your local supplier of LINDE products will be glad to help you select a standard PREST-O-LITE outfit that's job-matched to your work—or to help you make up a special assembly for any special need. See him today. If you don't know him already, write: LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

Linde Trade-Mark — UNION CARBIDE

"Linde" and "Prest-O-Lite" are trade-marks of Union Carbide Corporation.

Rasmusen

Jacklin

Piedrich

Clayton

About people . . .

Reidar P. C. Rasmusen has been appointed electrical engineer for Miller Electric Mfg. Co., Inc., Appleton, Wis. He was formerly electrical engineer at Battelle Memorial Institute. Rasmusen has served as chairman of the American Institute of Electrical Engineer's subcommittee on resistance welding instrumentation and as vice-chairman of the AIEE committee on electric welding.

Gordon Jacklin has been selected for Miller Electric Mfg. Co's recently-created post of assistant to the vice president in charge of sales, *C. B. Abel*. Jacklin will work on government quotations for welding equipment and act as a liaison between the sales office and field sales force of the Appleton, Wis., firm.

J. E. Massey has been appointed chief engineer of Delta Tank Mfg. Co., Inc., with headquarters in Baton Rouge, La. *John S. Perry* will assume Massey's former duties as district sales manager in the Houston office.

William N. Kiely has been promoted to senior field sales engineeer in the Midwest area by NRC Equipment Corp. Headquartering in Chicago, he will be responsible for sales and consulting services on the firm's line of high vacuum melting and heat treating furnaces, etc.

James R. Hickman has been named sales manager of the Webb Corp., Webb City, Mo.

Roger Tuthill, formerly with General Electric Co.'s welding department in York, Pa., is now assistant manager of development engineering for Air Reduction Sales Co., Union, N. J.

Because of illness, *Julius S. Cohn* has retired as president of Acetylene Oxygen Co., Harlingen, Texas. Succeeding him is *Raymond B. Wolf*.

August David Diedrich, Jr. has joined the Michigan district sales organization of Bay State Abrasive Products Co. He was formerly with Midwest Abrasive Co., Detroit.

New general manager, Electric Products Div. of Vickers, Inc., is *Gordon H. Clayton*. Plant and offices of the division are in St. Louis, where it turns out arc welders, selenium rectifiers, etc.

Dr. David W. Levinson has been advanced to assistant manager of the metals research department at Armour Research Foundation of Illinois Institute of Technology, Chicago.

Robert J. Dilger is new director of purchases for Tube Turns, Louisville, Ky. subsidiary of National Cylinder Gas Co.

New posts in Westinghouse Electric Corp.'s manufacturing and repair division went to: *V. J. Cozzarin*, manager of the Cincinnati plant; *A. C. Del Col*, manager of the Cleveland plant, who succeeds Cozzarin; and *H. L. Potter*, taking Del Col's former position as superintendent of the Cleveland repair plant.

A. J. Thoma, controller of Air Reduction Co., Inc., has been elected vice president and controller.

Bela M. Ronay was recently appointed a consultant in welding technology to Gulton Industries, Inc., Metuchen, N. J. He will concentrate on welding research activities of the firm's Advanced Development and Systems Dept. A frequent contributor to WELDING ENGINEER, Ronay has been a welding consultant since 1956. He had been welding superintendent of the U.S. Naval Engineering Experiment Station at Annapolis, Md.

NATIONAL CARBIDE
IN THE RED DRUM

HIGHEST QUALITY

DUST FREE

DEPENDABLE SUPPLY

Write for the name and address of the NATIONAL CARBIDE supplier nearest you.

National Carbide Company
A DIVISION OF AIR REDUCTION COMPANY, INCORPORATED
GENERAL OFFICES: 150 EAST 42ND STREET, NEW YORK 17, N. Y.
AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT

Monon Railroad Speeds Car Repair with Arcair

Use of the Arcair torch at the Monon Railroad Car Shops, Lafayette, Ind., is standard procedure on all types of cutting and gouging applications.

Here's why . . . Arcair has cut metal removal time on all jobs encountered. On car repair, for example, it formerly took 6 hours to vee out a center plate cracked stem to stern. Now, Arcair gouging *plus* re-weld takes a total of only 2 hours, just ⅓ the time. And three Arcair Model H-3 torches are used "just about every place"—removing truck pedestal liner welds, welded patches, etc.

Arcair can help you too! Basic simplicity—electric arc plus ordinary compressed air — makes Arcair the new, efficient, cost-cutting answer to your metal removing problems.

Get more information from Arcair today!

Arcair Metal Removal Torches
427 S. Mt. Pleasant St., Lancaster, Ohio

Recent promotions at Norton Co. went to *Paul C. Washburn*, field engineer in the Southern area and *Richard B. Hardy*, sales trainee. Washburn will serve as abrasive engineer with headquarters in Birmingham, Ala., and Hardy is assigned as a field engineer in the Philadelphia area.

Gerald L. Moran has been appointed vice president of the Chemical and Metallurgical Div. of Sylvania Electric Products Inc. He will continue as general manager of the division with headquarters in Towanda, Pa.

Fred R. Soyka has been appointed director of purchases of Eutectic Welding Alloys Corp., Flushing, N. Y. He will be responsible for purchases of all metals, chemicals and other items used in producing the firm's low temperature alloys.

Ludwig Anselmini has joined the staff of the Stainless Steel and Heat Resistant Alloys section of the Development and Research Div. of International Nickel Co., Inc. He will specialize in corrosion and heat-resistant alloy castings.

R. S. Poister, senior vice president of Crucible Steel Co., is retiring after 44 years in the steel industry.

Died . . .

Robert H. Hoffman, 43, president of the Robert W. Hoffman Co., Chicago, died recently. He was a member of the American Foundrymen's Society, Chicago Chapter, a past president of the Cary, Ill., Lyons Club, a former county deputy sheriff and a member of the Cary fire department.

William A. Geng, 38, sales representative for Sellstrom Mfg. Co., Palatine, Ill., died April 5 after a lingering illness. Burial was in Buffalo, N. Y., Mr. Geng's home.

George Vincent Slottman, 54 vice president-research and engineering of Air Reduction Co., Inc., died April 21 in New York City. In 1955 Dr. Slottman received the Morehead Medal for his contributions to carbide, acetylene and oxygen technology. He joined Airco in 1934.

NEWS . . . . . *from page 8*

a hemispherical section welded together. Because of size, shape and weight requirements, new welding techniques, which Kidde engineers would not divulge, had to be devised. The container weighs 84 lb, is 34.7 in. long, 13.6 in. in diameter and burst pressure is 6,667 psi.

Nuclear Society moves to Chicago

Chicago, the birthplace of nuclear energy, is to be the new home of the American Nuclear Society. On July 1 headquarters will move from Oak Ridge, Tenn., to the John Crerar Library, 86 E. Randolph St., Chicago.

Canada AWS holds welding show

The Canadian Welding Show was held recently as part of the National Industrial Production Show of Canada. Sponsored by the Canadian Welding Society, the show was held in Toronto's Industry Building, Exhibition Park.

Perfect timing puffs profits

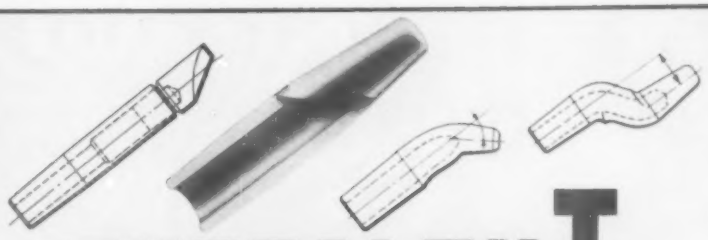
Because Twin Arc Welding Co. had more than 3,000 ft of steel pipe on the job site before it was needed, a three-man crew was able to work constantly and productively, and without holding up other contractors. Having materials on hand was the key to profits on the heating job of a new $1,700,000 high school, says Anthony A. Madonna, owner of the Lancaster, Pa., firm.

Burdett opens Detroit branch

A new branch of Burdett Oxygen Co., Cleveland, has been opened in Detroit, Mich., at 20137 Sherwood Ave. J. E. Rooney will be general manager of the Detroit unit and Leonard Holton is assistant manager.

Battelle scores titanium first

The first successful cold extrusion of hollow titanium shapes, a major step in the development of economic methods for producing hollow aircraft parts, was recently accomplished by Battelle Memorial Institute. The work was done for the Air Force.



TUFFALOY

Resistance Welding Alloys

• **SPOTWELDING TIPS, a complete line** . . . R.W.M.A. Standard Tips, 'Tuffcap' Standard Tips, Cold-Formed Tips, Copper-Tungsten Faced Tips and many "Specials", all *carried in stock* in a wide selection of active types and sizes.

• **BAR STOCK,** round, hexagon, square and rectangular.

• **FORGINGS,** a large stock of bars and wheels available for finishing. Special forgings to order, rough, or finish-machined.

• **WELDING TIP HOLDERS and ADAPTERS**

You too may depend on *Tuffaloy,* with its record of over twenty years of prompt service and consistently high quality.

See your nearest AIRCO or TUFFALOY representative.

Ask for Catalog and Price List.

AIRCO®

AIR REDUCTION SALES COMPANY

A Division of Air Reduction Co., Inc.

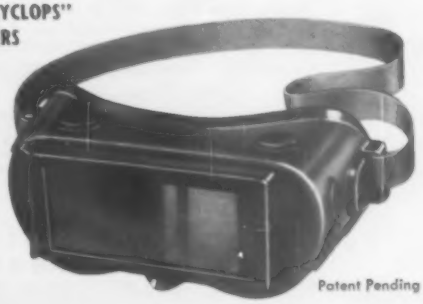
150 East 42nd Street, New York 17, N.Y.

Patent Pending

STYLE 5050—WELSH "SOFT-I" COVER GOGGLES FOR WELDERS

SOFT, LIGHT, PLIABLE WELSH FRAMES PROVIDE NEW COMFORT IN EYE PROTECTION

STYLE 5070—WELSH "CYCLOPS" EYE SHIELDS FOR WELDERS with simplified lens holder.



Patent Pending

WELSH MANUFACTURING CO.

9 MAGNOLIA ST., PROVIDENCE, R. I.

THIS IS LOW COST WELDING!

When a touch on a button moves weldments like these into the correct, most convenient position for a downhand pass, you get more arc time, more welding at lower cost. C-F power operated Positioners rotate the work in a full circle at any point in a range of 135° from the horizontal—giving welders a choice of an infinite number of downhand welding positions instantly.

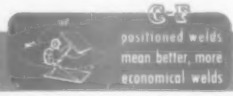
Every requirement for faster, better positioned welding—constant or variable speed table rotation, full 135° tilt, self-locking gearing which holds the table in any position, oversize built-in main tilt, and rotating bearings, choice of two base styles, and many other features—are built into C-F Positioners.

C-F Positioners are available in Hand or Power operated models, and are made in capacities up to 30,000 lbs. and larger.

Write for the new C-F Positioner Catalog

CULLEN-FRIESTEDT CO.
1302 S. Kilbourn Avenue Chicago 23, Illinois

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.



C-F positioned welds mean better, more economical welds

Nedco ANNOUNCES NEW STRAIGHT LINE

SINCE 1926

Aerial Type Grinders for use with High Speed Cutting Wheels

2 Models — 6 in. and 5 in. Wheel Diameters
1½ and 2 Horsepower — 7,000 R.P.M.

For Angle Grinding Depend on NEDCO

3 Models — 9" and 7" Discs — 1, 1½ and 2 H.P.
5,000, 5,300 or 6,000 R.P.M.
Sold throughout the U.S.A. — Send for free catalogue
Genuine Nedco Tools are Made Only by:

THE NEDCO CO.
27 Jones Rd., Waltham 54, Mass.

Officers, directors named at IAA meet

At the International Acetylene Association's recent business meeting in Philadelphia new officers, directors and an executive committee were named. Dr. H. S. Sutherland, Shawinigan Chemicals Ltd., Montreal, was elected president; L. L. McBurney, Smith Welding Equipment Corp., Minneapolis, vice president; R. A. Speck, National Carbide Co., New York, treasurer; and H. F. Reinhard, New York, secretary.

The board of directors for 1958-59 includes: C. G. Andrew, Air Reduction Sales Co., New York; L. W. Hench, American Oxygen Service Corp., Harrison, N. J.; C. K. Rickel, Big Three Welding Supply Co., Fort Worth; C. E. Monlux, Linde Co., New York; C. McL. Pitts, The People's Gas Supply Co., Ltd., Ottawa; P. F. Lavedan, Liquid Carbonic, Chicago; Eugene Easterly, Union Carbide International Co., New York; J. L. Adank, National Cylinder Gas Co., Chicago; C. M. Schwab, Shawinigan Products Corp., New York.

Appointed to serve as the executive committee for this year were: R. B. Swope, Southern Oxygen Co., Washington, chairman; C. G. Andrew, L. W. Hench and C. E. Monlux.

CB&I buys Conkey patents, property

Chicago Bridge & Iron Co. has purchased Conkey equipment, patents, applications, drawings, patterns and records from Henry Hunter and George Dickey of New York. The Conkey division has been integrated with CB&I, and Hunter and Dickey will serve as consultants for the firm.

Golf tourney

HEADING up the Chicago chapter of the American Welding Society's golf tournament are (left to right) Bill Craske, Arcos Corp., vice chairman; Don Thor, National Cylinder Gas Co., general chairman; Roy Becker, International Harvester Co., vice chairman and James K. Calhoun, Bastian-Blessing Co., advisor. The tournament will take place June 14 at Nordic Hills Country Club, Itasca, Ill.

RECENT Korean visitors to Eutectic's New York plant included: Sang Yool Moon, John Brennan, U.S. Labor Dept. guide, Hi Chun Joo, Hak Kin Kim, Jin Kyun Park and Harley Erickson, production manager of Eutectic. *(See story)*

Korean engineers tour Eutectic

As part of an exchange program sponsored by the State Department, Korean engineers recently inspected manufacturing processes at the Eutectic Welding Alloys plant in Flushing, N. Y. Under the program, key industry and government experts are invited to this country to see American practices. They take home new ideas for progress and development of home industry.

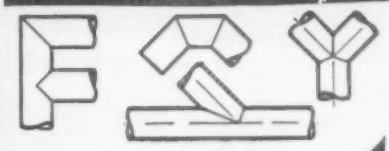
Rocket tests fueled through welded tank

A welded "battleship" tank, used as a reservoir for fuel in rocket engine tests, is 45 ft long and has a diameter of almost 8 ft and a capacity of 9,300. The 31,000 lb tank is made of types 321 and 347 stainless steel supplied by Allegheny Ludlum Steel Corp. Standard Steel Corp. fabricated the tank for Rocketdyne, a division of North American Aviation, Inc. The tank will feed fuels to rocket engine systems in development tests.

Carborundum Co. opens new lab

The Electro Minerals Div. of the Carborundum Co. has opened a product development laboratory to meet increasing demand for technical information, the Niagara Falls, N.Y., firm reports.

ANY Pipe Joint or Structural Angle Cut NOW Layed Out in Just MINUTES!



- Marks off easily and accurately any pipe joint.
- Eliminates all figuring of cut backs, and marks all around pipe.
- Saves man-hours, as well as oxygen and acetylene gas.
- Makes it easy to mark off end of lateral pipe.

NO MISTAKES — NO TIME LOSS

—regardless of the type or size of pipe joint to be welded. No more "cut and try" with a **CONTOUR MARKER** — it eliminates the need for calculation, and is available in 2 sizes for marking pipe and structurals of 1½" to 18" in cross section, and from 16" to 48" diameter. Send for complete description.

CONTOUR MARKER CORP.
1843 E. Compton Bl., Compton, Cal.
Also Mfgrs. of Boyce Centering Heads, Radius Markers and Pipe Flange Aligners.

THE CONTOUR MARKER

"I GET SAFE AND ECONOMICAL WELDING INSPECTIONS WITH PORTABLE GAMMA RADIOGRAPHY MACHINE"

The President of Universal Technical Testing Laboratories Inc., Havertown, Pa., praises the safety, portability, economy and versatility of Nuclear Systems' Model 40 Iriditron radiography machine.

Said Mr. William J. Duffy, "It weighs only 40 pounds and one man can put it in the trunk of a car, take it to the job and make quick and safe exposures. This portability saves us time and money.

"Using Iridium 192 as the source, this Model 40 machine is equivalent to a 440 KVP X-ray machine."

Nuclear Systems provides a complete line of radiography equipment enabling you to make on-the-spot exposures at refineries, foundries and for field work such as pipelines.

Call on Nuclear Systems for all your radiography equipment needs. Company offices in Philadelphia, Chicago and San Francisco. Sales representatives in principal cities. Catalog upon request.

NUCLEAR SYSTEMS
A DIVISION OF THE BUDD COMPANY, Philadelphia 32
Budd

BECKER

CARBON WELDER BRUSHES

for all types and makes of welding equipment

Everything you need from *one* source, with *one* responsibility. The fast, economical way to order. Catalog gives complete specifications, factory numbers, scaled drawings, etc. Write for your free copy today.

WHOLESALERS:
Some Distributorships still open.
Write for information.

BECKER BROTHERS CARBON CO.
3450 SO. LARAMIE AVE • CICERO 50, ILLINOIS

DISTRIBUTORS!

Want a New Profit Line?

ELMET, the top quality brand of pure and thoriated tungsten welding electrodes invites your inquiries.

- *Attractive discount schedule*
- *Steadily growing demand*
- *An all-industries essential*
- *Ample stocks carried at all times*
- *Prompt shipment assured on all orders*

Old established firm in business since 1929.
Wire, phone or write

Elmet Division
North American Philips Company, Inc.
1558 Lisbon Road, Lewiston, Me.

Hobart's Thompson wins design award

For the best use of material in the design of a new glass fiber reinforced plastic welding helmet, Jim Thompson won a citation and $50 check. Thompson designed Hobart Brothers Co.'s new line of welding helmets. The award, given by the *Materials in Design Engineering* magazine, was made in Chicago recently.

Ampco scores victory over corrosion cracking

With Ampco Metal Inc.'s new "Grade 8" aluminum bronze alloy, it is not necessary to stress relieve all finished fabrications to guard against stress corrosion cracking, the firm says. Field changes, alterations or repairs can be made without heat treatment with the new alloy, which has been patented in the U.S. and has patents pending in six foreign countries.

The alloy now occupies the Milwaukee firm's No. 2 selling spot, and is expected to become its largest seller. J. D. Zaiser, president of Ampco, said the development will enable the firm to offer products in a larger number of fields, particularly in the vapor phase of corrosive media.

AtomFair features nuclear reactor, ship

At the recent Chicago AtomFair, push-button exhibits which emphasized harnessing the atom for peace were displayed. Visitors operated a working model of the $45 million reactor that will furnish power to the Chicago area in two years. Another display highlighted steps in construction of the N.S. (nuclear ship) Savannah, this country's first atomic merchant ship.

General Electric is building the Chicago reactor, and the $39 million N.S. Savannah is being designed and built by Babcock and Wilcox, New York City.

LEFT to right: Thomas H. Nicholl, class instructor; Blaine G. Harrington, section chairman; Joseph M. Payne, national technical committee and A. G. Hedstrom, section educational committee chairman.

Kansas City AWS holds weld course

A current 10-week course in welding metallurgy is being sponsored by the Kansas City Section of the American Welding Society. Instructor for the course is Thomas H. Nicholl, district manager of Lincoln Electric Co. Classes are held one evening a week on the University of Kansas City campus. Enrollment is 116 students, including engineers, designers, draftsmen, inspectors, weldors, etc.

Guest instructors who have given first-hand viewpoints on a particular phase of the welding industry are: Frederick D. Seaman, Westinghouse Electric Co., Kansas City; Gordon H. Moline, Metallurgical, Inc., Kansas City; Hugh A. Springer, Union Wire Rope Corp., Kansas City and Dr. Howard and Charles Minnich of the James W. Weldon Laboratory, Kansas City.

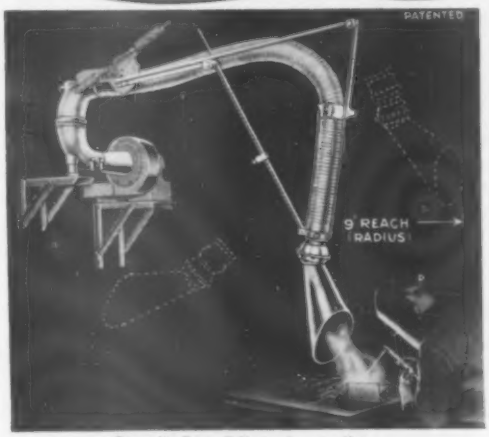
Issue supplement to ASTM standards

The American Society for Testing Materials recently released its 1957 supplement to the 1955 book of ASTM Standards, which is issued triennially. Part I covers ferrous metals; part II, non-ferrous metals. The supplement, which contains five other parts, sells for $4 per part.

Oakite adds two divisions

Rochester is headquarters of a new Upper New York State Div. for Oakite Products, Inc., and a new Mid South Div. will operate out of Louisville, Ky. Walter G. Sittmann, formerly Pittsburgh division manager, will head the New York division, and Victor L. Baltzell, representative in Dallas for the past 5 years, will manage the southern division.

"It certainly is a relief to have fumes and heat removed while I'm welding. The Ruemelin Collector has great suction. It makes a day's work pleasanter!"



Ruemelin Fume Collector in operation.

Welding shops equipped with Ruemelin Fume Collectors are assured of a clean shop atmosphere. Noxious fumes, heat and smoke are eliminated at their source, thus improving working conditions, lessening fatigue and paving the way for increased plant production.

The Ruemelin Fume Collector hood can be instantly placed where needed anywhere in the booth welding area. No tedious adjustments necessary. Just pull the inlet hood to the welding position and you are ready to go.

Note the new spring-loaded counterbalance mechanism which makes Fume Collector much easier to handle. Ask for Bulletin 37-E illustrating this new feature.

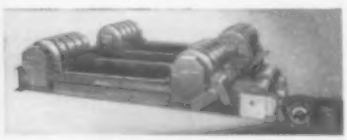
RUEMELIN MFG. CO.

MANUFACTURERS AND ENGINEERS
SAND BLAST AND DUST COLLECTING EQUIPMENT
3880 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

ARONSON
Offers You Over 200 PROVEN Standard Stock Models of Quality POSITIONERS "POSITIONEERED" to your exact Requirements

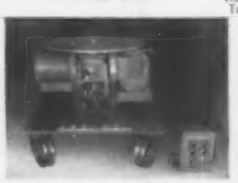
Aronson TracTrod (T. M. Reg.) Turning Rolls for thin-walled heavy cylindrical work to 27 tons capacity. Zero to 100 IPM turning speed and Built-In Grounding.

Aronson Universal Balance Positioners (T. M. Reg.) position your weldments effectively, instantly for downhand welding. Capacities to 2000 lbs.



Heavy Duty Precision Built Rubber and Steel Tired Turning and Pipe Rolls, 100% overload protected. Capacities to 600 Tons.

Fully Automatic Gear Driven Positioners, featuring Geared Elevation, 135° Tilting and Variable or Constant Speed Rotation. Capacities to 350,000 lbs.



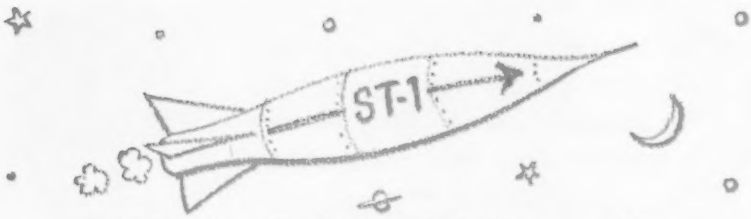
Model D Gear Driven Positioners. Compact. Precise. Rugged. Capacities to 1000 lbs.

Rugged Head and Tail Stock for positioning bulky weldments between centers. Table Backup for Zero Deflection. Magnetic Braking. Capacities to 160,000 lbs. Geared Elevation Optional.

Heavy Duty Floor Turntables with precision speed control and Magnetic Braking, used for welding, burning, X-raying, etc. Capacities to 120,000 lbs., various heights and speeds.

Bench Turntable Automatic Positioners with Mercury Grounding. Capacities to 500 lbs.

Quality POSITIONERS by **Aronson MACHINE COMPANY**
ARCADE, NEW YORK



Will the ST-1 orbit the earth?

Gosh no, once you put it in your shop, it'll probably stay right there for years and years.

Well, is it ram-jet powered?

It's got a ram alright, but it's hydraulically powered. Works real smooth and easy.

Does that develop sufficient thrust?

Sure, you can test most any spotweld, strip, or wire within its 20,000 lb. capacity.

Will it ever break the sound barrier?

What! We've got skilled people making the ST-1, it doesn't make hardly any noise.

what kind of a missile is this?

The ST-1 isn't a missile, it's a tensile testing machine, and we've been making it and other quality testing machines for years. You better write for more information, friend!

DETROIT TESTING MACHINE COMPANY

9380 Grinnell Avenue, Detroit 13, Michigan

TFC

has everything for

Ornamental Iron Shops

The complete one-order supplier for you!

• Tools • Machinery • Finishes

• Over 400 Casting Designs—PLUS Selling aids!

Ornamental Iron Finish—a plastic-base paint especially developed for painting ornamental metal work. Costs no more than ordinary metal paints. Money-back guarantee. Colors: Gloss Black, Satin Black, White, Primrose Yellow, Natural Gray, Warm Gray, Green.

50-gal. drum ..... $4.26 per gal.
5-gal. can ..... 4.36 per gal.
1-gal. can ..... 4.46 ea.

"CS" Welding Electrodes—Specially designed for welding cast iron to steel or cast iron to cast iron. Clean spatter-free welds! Costs less than other rods for welding cast to steel!

1/8 x 14" (25 lb. box) ... lb. 87c
5/32 x 14" (25 lb. box) ... lb. 81c

TFC Metal Primer — A superior homogenized primer . . . will not lift or bleed. Excellent coverage. Fully rust-inhibitive. Red or Black.

5-gal. cans ..... $3.15 per gal.
1-gal. cans ..... 3.26 ea.
50-gal. dr. ..... 3.05 per gal.

All Prices F.O.B. Memphis

Tennessee Fabricating Co.
1245 Grimes St.
Memphis, Tenn.

TFC

Please enter our order for:

☐ SEND FREE 32-PAGE CATALOG
Includes more than 400 casting designs

Name.....

Address.....

City.....State.....

HI-AMP®

ELECTRODE HOLDERS

GROUND CLAMPS

SAFETY

ECONOMY

COMFORT

- All Glass Fiber insulation.
- Co-Axial Springs.
- No "Bare" metal on handle.
- "Twin Screw" cable clamp.

Manufactured by

LENCO, INC.

JACKSON, MISSOURI

Schmidt wins award for field sales

Outstanding service in field sales activity won an award for Ted Schmidt, technical representative for Eutectic Welding Alloys Corp., Flushing 58, N. Y. His prize: a gold lapel pin with a diamond insert.

Square D builds Pittsburgh office

Construction is underway on a 10,000 sq ft regional headquarters in Pittsburgh for Square D Co. and its division, Electric Controller & Mfg. Co. The building is being erected on the city's west side in a new industrial development. It should be completed in early summer.

As a result of setting up a new region which includes Pittsburgh, Buffalo and Rochester, N.Y., Joseph D. Brick has beeen appointed regional manager and Charles W. Duffett named district manager.

Cleveland Crane builds new plant

A new 11,400 sq ft Research and Development Building is under construction at the Cleveland Crane & Engineering Co., Wickliffe, Ohio. The building will include a modern air conditioned engineering department and complete shop and testing facilities for equipment being developed. The building is scheduled for completion in June.

Cee-Kay Supply enlarges quarters

Cee-Kay Supply Inc. recently moved to larger quarters at 4244 Folsom Ave., St. Louis. NCG Div. of National Cylinder Gas Co. cooperated with Cee-Kay in a clinic when the firm dedicated its new facilities. Demonstrations of flame-cutting and welding, inert arc welding and other processes were included in the clinic.

Westinghouse show "hits the road"

With a professionally acted and directed theatrical show, Westinghouse Electric Corp. is reminding America that its expanding industry is electrically underpowered. The road show is booked to play in more than 125 cities through this country between now and mid-summer. It is aimed at the men who have a "say" in what kind of equipment will be installed in new or remodeled industrial, commercial or institutional buildings. The show will be seen by some 20,000, Westinghouse estimates.

Pipe Line News

The Federal Power Commission has authorized Tensas Gas Gathering Corp., Shreveport, La., to construct and operate natural gas facilities in Mississippi and Louisiana at an estimated cost of $855,400. Tensas will construct about 36.61 miles of 2- to 8-in. pipeline.

Southern Natural Gas Co., Birmingham, will build about 12½ miles of pipeline and a measuring station at a cost of $886,510. The line will extend from the west bank of the Mississippi River to the Tantine Field in Plaquemines Parish, La.

Texas Eastern Transmission Corp., Shreveport, La., will build 59 miles of 30-in. and 22 miles of 14-in. pipeline, 141,780 additional hp in compressor stations and a new 2,200 hp compressor station. Cost will run about $37,435,000.

Michigan Gas Storage Co., Jackson, Mich., will construct natural gas facilities at a cost of $3,990,000 in central Michigan. About 40 miles of 26-in. pipeline and 25 new wells will be built.

The El Paso Natural Gas Co. will build pipeline facilities for Arizona and California customers. The firm will construct 1,141 miles of pipeline at a cost of $138,538,000.

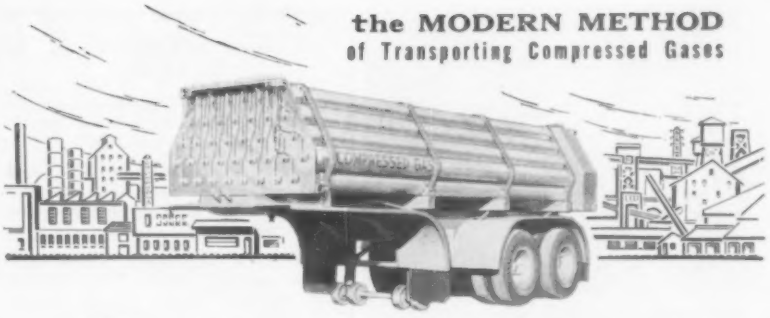
Southern Natural Gas Co., Birmingham, and the Northern Natural Gas Co., Omaha, will connect a transmission system to natural gas reserves in southern Louisiana. Southern will construct 45 miles of line at $4,133,700. Northern will build about 28 miles of 30-in. loop pipeline in the Texas and Oklahoma panhandles, at a cost of $3,020,000.

Transcontinental Gas Pipe Line Corp., Houston, at a cost of $705,000, will build facilities to receive natural gas purchased in Atascosa County, Texas. It will construct 23.33 miles of 6- and 8-in. purchase lateral lines and four purchase meter stations in Atascosa county.

Temporary authorizations to construct natural gas facilities totaling $8,231,700 has been granted Southern Natural Gas Co., Birmingham, and El Paso Natural Gas Co., El Paso. Southern will construct 45.3 miles.

B&W to build boilers for Navy destroyers

Babcock & Wilcox Co. will furnish eight boilers for two guided missile-carrying U.S. Navy destroyers, the firm reports. The $2 million contract was awarded by Defoe Shipbuilding Co. of Bay City, Mich.



INDEPENDENT ENGINEERING — IECO

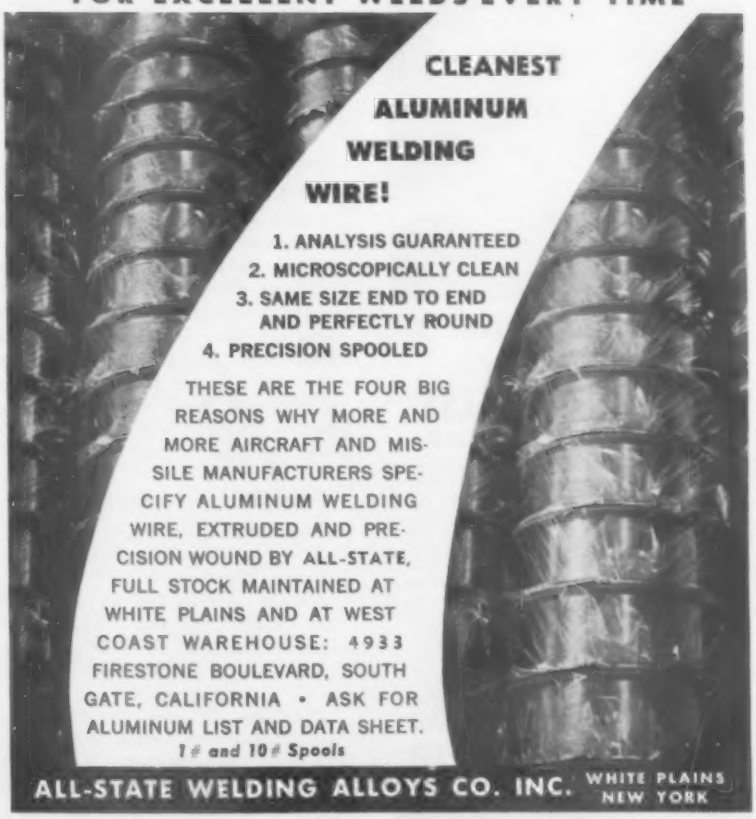
gas supply TRAILERS tailored just for YOU

- MANIFOLD & CONTROLS — for YOUR Gas and Handling Requirements
- CAPACITY — to meet YOUR Requirements
- SAFETY — Cylinders, Safety Devices, Controls etc., All in accordance with ICC Requirements for YOUR Protection.
- CHASSIS — by leading Chassis Manufacturers with Service Branches throughout the United States for YOUR Convenience.

SEND YOUR INQUIRIES TODAY TO

INDEPENDENT ENGINEERING COMPANY, Inc.
Manufacturers of
CONSULTING IECO DESIGNING RESEARCH
CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · NITROGEN · ARGON
O'FALLON 5, ILLINOIS

FOR EXCELLENT WELDS EVERY TIME


CLEANEST
ALUMINUM
WELDING
WIRE!
1. ANALYSIS GUARANTEED
2. MICROSCOPICALLY CLEAN
3. SAME SIZE END TO END AND PERFECTLY ROUND
4. PRECISION SPOOLED
THESE ARE THE FOUR BIG REASONS WHY MORE AND MORE AIRCRAFT AND MISSILE MANUFACTURERS SPECIFY ALUMINUM WELDING WIRE, EXTRUDED AND PRECISION WOUND BY ALL-STATE. FULL STOCK MAINTAINED AT WHITE PLAINS AND AT WEST COAST WAREHOUSE: 4933 FIRESTONE BOULEVARD, SOUTH GATE, CALIFORNIA • ASK FOR ALUMINUM LIST AND DATA SHEET.
1# and 10# Spools
ALL-STATE WELDING ALLOYS CO. INC.
WHITE PLAINS NEW YORK

When You Weld Cast Iron
Select the Correct

Fuse-Well

CAST IRON WELDING RODS OR ELECTRODES

FUSE-WELL NO. 11

FUSE-WELL No. 11, *Square*—Gray Cast Iron Welding Rod for Acetylene use in filling or building up new or worn castings producing machineable welds.

FUSE-WELL NO. 12

FUSE-WELL No. 12, *Round*—Has the same uses and analytical ingredients as Fuse-Well No. 11.

FUSE-WELL NO. 14 MOLY

FUSE-WELL No. 14, *Moly*—An Iron Base Rod with alloys added for finer grain structure and greater strength.

FUSE-WELL NO. 22

FUSE-WELL No. 22, *Electrode* — Light coated Rod to be used for AC or DC welding in the fabricating and repairing of cast iron castings.

Sold through Leading Distributors

THE CHICAGO HARDWARE FOUNDRY CO.
Weld Rod Division
NORTH CHICAGO, ILLINOIS

Get the exact current for quality welding!

USE THE TONG-TEST
AC-DC AMMETER

Don't assume your welders are using the right amperage. *Be certain* by controlling welding quality with the Columbia Tong Test AC-DC Ammeter, the only clamp-type instrument that measures both alternating and direct current. Snap tongs around the electrode cable for instant readings. Available in five types with interchangeable ranges up to 1000 amperes. Impossible to read wrong scale. No coils or wires to burn out—no electrical connections needed.

COLUMBIA

Write for Illustrated 8-page Catalog WE-400

COLUMBIA ELECTRIC MFG. CO.
4551 Hamilton Avenue • Cleveland 14, Ohio

COMING EVENTS

JUNE 2-6: National Welding Seminar, Wallberg Memorial Building, University of Toronto, Toronto, Ont.

JUNE 10-13: Third National Coated Abrasives Machinery Show, Product Engineering Building, Behr-Manning Co., Troy, N.Y.

JUNE 16-18: Compressed Gas Association meeting, Seaview Country Club, Absecon, N. J.

JUNE 30-JULY 1: Independent Oxygen Manufacturer's Association convention, Poland Spring, Maine.

SEPT. 8-10: Canadian Section, Compressed Gas Association meeting, Seigniory Club, Montebello, P.Q., Canada.

Diversey opens Canadian plant

Diversey Corp., Chicago, has opened a new $750,000 plant in Clarkston, Ontario. It will be the new headquarters of Diversey Corp. of Canada, Ltd., and will house 58,000 sq ft of space.

B&D subsidiary in Rotterdam

Servicing the Netherland's electric tool company's products is a new Black & Decker Co. subsidiary, Black & Decker (Nederland) N. V. Martin Van Tol, area sales representative for the Towson, Md., firm, will be in charge of the Rotterdam office.

Meeting features space age problems

Materials handling problems in the atomic and space age are among topics to be featured at the Materials Handling Conference at Cleveland's Public Auditorium June 9-12. Sponsored by the American Society of Mechanical Engineers, the conference will be held concurrently with the National Materials Handling Exposition, which will include more than 100 basic types of machines.

Distributor appointments

Thomas A. Edison Co., W. Orange, N.J.: Gasarc Welding Sales Co., W. Orange, N.J.

United Specialties, Inc., El Dorado, Ark.: Case and Gibson, Charlotte, N. C.; John B. Wiley, Los Angeles; George H. Davison, Marietta, Ga.

Precision Welder & Flexopress Corp., Cincinnati; Heck & Co., Inc., Chicago; Zimmerman and Gammond, Inc., Park Ridge, Ill.; Howard Gordon, Rosemont, Pa.

Just You TRY to *Break a*

THERMO *Spiral*

TIP CLEANER

The exclusive, non-breakable advantage of THERMO TIP cleaners didn't just happen—No Sir. This feature resulted after 10 years research, and experience. That's why we say no other type or make can match a THERMO, and the best way to prove that statement is to send for a FREE THERMO Spiral Tip Cleaner and put it to every test—as to its cleaning efficiency and long lasting performances. Yes, just TRY to break it—then you'll know why—

All progressive Welding Supply dealers Recommend THERMO TIP CLEANERS

THERMACOTE COMPANY
108 S. DeLacey Ave. PASADENA, CALIFORNIA

"ANTI-BORAX"

"ROYAL"
CASE-HARDENING POWDER

- More effective than cyanide. Gives off no dangerous fumes. Simplifies the work. Economical to use.
- Makes low-grade steel perform like high-grade steel.
- Enables the weldor or blacksmith to produce a finer cutting tool with technical equipment.
- Produces a .01 to .02 in. case depth with necessary Brinnell toughness on large and small low-carbon steel tools and parts.
- Write for sample and descriptive booklet.
- Manufactured by the makers of "E-Z", & "Crescent", Welding Compounds and "Anti-Borax" Oxy-Acetylene Welding and Brazing Fluxes.

ANTI-BORAX COMPOUND CO., INC.
FORT WAYNE 9, INDIANA

9 ways better

Picker GARDRAY radiation badges

1 wide intensity range
Records exposures low as 50 mr, high as 300,000 mr.

2 wide energy range
Gamma, beta, x-rays (soft and hard) single or mixed exposures.

3 "control" safeguard
Separate control badge guards against accidental fogging.

4 double-sure identification
1 code printed on wrapper
2 x-rayed on film

5 no loading or unloading
Wear badge as received, return it intact.

6 prompt reporting
Dependable, easy-to-read, too.

7 compact, lightweight
See size above: less than 1 oz.

8 attractive, unobtrusive
Clips on firmly, won't catch clothing.

9 durable
Secure snap-locks, won't come undone, won't break.

To subscribe, call any Picker X-Ray local office (see your 'phone book) or write to Picker X-Ray Corporation, 25 So. Broadway, White Plains, N. Y.

30 YEARS AGO

(Taken from *The Welding Engineer* of June, 1928)

From an editorial: It is hard to tell at present just what possibilities are in the future for the replacement of castings by welded rolled steel shapes.

—30 YEARS AGO—

A welding engineer 1) knows scientific fundamentals and advantages of all welding processes 2) has a reasonable degree of manual skill in welding operations 3) knows metallurgy and metallography to understand structural changes caused by welding 4) is able to redesign a product to gain all advantages of welded construction 5) knows the various makes of welding apparatus and supplies and 6) is able to select and train dependable operators.

—30 YEARS AGO—

James W. Owens, director of welding for the Newport News (Va.) Shipbuilding & Drydock Co., won first prize of $10,000 in the recent Lincoln arc welding contest.

—30 YEARS AGO—

The National Fire Protection Association's committee on tanks revised rulings to permit oxyacetylene welding to be used in many places on tanks.

—30 YEARS AGO—

Largest all-electric arc welded low pressure gas holder ever built has been completed at Albion, Mich., by the Western Gas Construction Co. of Fort Wayne, Indiana. Holder stands 113 ft 7 in. above foundation, has 74 ft diameter and weighs 516,385 lb.

—30 YEARS AGO—

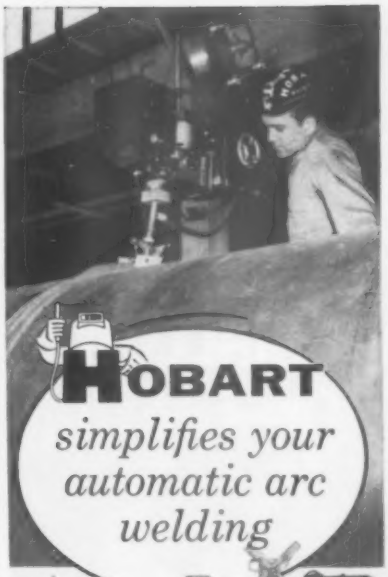
F. L. Rodgers was elected chairman of the Western New York section of AWS. He is district sales manager of Linde Air Products Co., Buffalo.

—30 YEARS AGO—

A. O. Smith Corp. has received an order from the Texas Co. for 24,000 tons of electrically welded 8-in. steel pipe to be used for an oil line. The order will total about 1,000 carloads.

—30 YEARS AGO—

L. W. O'Day, formerly with Lincoln Electric Co., recently joined the sales forces of the Koro Corp., Waukegan, Ill.



HOBART *simplifies your automatic arc welding*

Model ASM-5D Automatic Welding Head for Submerged Arc Welding

CUTS PRODUCTION COSTS— You'll be amazed at the advantages Hobart automatic submerged arc welding can bring you. Simplified controls govern the work so accurately that arc length is automatically adjusted to compensate for poor fit-up, uneven joints or tack welds. You'll get highly uniform top quality results every time from Hobart's Submerged Arc, Carbon Dioxide and Inert Gas welding equipment. You owe yourself the opportunity to see how easy you can realize big savings on production costs.

Model COG-11TB Carbon Dioxide (CO_2) Automatic Welding Head

Model AIG-13D Automatic Inert Gas Welding Head

HOBART BROS. CO., Box U-683 TROY, OHIO
"manufacturers of the world's most complete line of arc welding equipment"

Hobart Bros. Co., Box U-683 Troy, O., Ph. FE 2-1223
Please send me, without obligation, complete information on the following:
☐ Model ASM-5D ☐ Model AIG-13D
☐ Model COG-11TB

Name_____
Firm_____
Address_____
City_____ Zone____ State_____

for a

SURE, EASY START

with

SHALLOW PENETRATION

you want

AIRCO 90C

* Airco 90C all-position electrodes are unusually efficient where penetration must be shallow.
* Weld storage tanks, air frames, metal furniture, a broad range of sheet applications.
* Weld the bulk of jobs done by garages, small shops, and on farms.

Airco 90C electrodes give a sure and easy arc start. Operate without interruption on transformers of low open circuit voltage, or on DC, either polarity. Give a smooth, uniform, convex deposit.

FREE — Send for the handy Airco Electrode Guide. It will help you select the right electrode for your specific job. Request catalog 1318.

Authorized Airco Dealers in principal cities

AIRCO®

AIR REDUCTION SALES COMPANY

A division of Air Reduction Company, Incorporated

150 East 42nd Street, New York 17, N. Y.

free literature..... *USE CARD ON PAGE 105*

51. ELECTRODE HOLDERS — Tweco Products, Inc. Electrode holders, ground clamps, cable connectors, terminal connectors, splicer, etc. are detailed in illustrated page CP-58.

52. GRINDING WHEELS—American Emery Wheel Works. New development "K and KP Vitrified Bonds" for grinding wheels and segments is illustrated in bulletin HCG 4785.

53. COMPRESSED GASES—The Matheson Co., Inc. "Compressed gases and gas regulators" is title of 35-page bulletin giving specifications on gases, regulators, controls, quick couplers, etc.

54. FLAME CUTTER—Air Reduction Sales Co. New 16-page catalog ADC 706D covers features of No. 56 Oxygraph flame cutting machine. Deals with design and performance features.

55. TITANIUM—Mallory-Sharon Metals Corp. An 8-page brochure describes properties and corrosion resistance of pure titanium. Fabrication techniques outlined.

56. HEAVY-DUTY ENGINES—Wisconsin Motor Corp. Engine bulletin S-223 covers full line of heavy-duty air-cooled engines, 3 to 56 hp, power components for portable welders.

57. C-CLAMPS—Wilton Tool Mfg. Co., Inc. Catalog 692 contains news of C-clamp design development.

58. PLASTIC TAPE — United Mineral Chemical Corp. Plastic and paper edge-binding tapes for technical drawings, documents and records described on page which includes prices.

59. BENCH WELDER—Graham Mfg. Corp. Model 3000 single-gun bench welder is detailed in bulletin 3000. Includes specifications.

60. BRASS FORGINGS — Titan Metal Mfg. Co. "The Titan Story" is title of folder explaining advantages of using firm's brass forgings.

61. RAM BENDING—Wallace Supplies Mfg. Co. Booklet covers three different types of ram benders, includes specifications.

62. PRESS WELDERS—Progressive Welder Sales Co. The "Press welder manual" outlines structure and functions of press welders, from "theory of welding" to "useful hints."

63. CYLINDER VALVES—The Matheson Co., Inc. Cylinder valve outlets and connections are detailed in bulletin. Illustrates many connections.

64. STAINLESS STEEL—O. G. Kelley & Co. Stainless steel process equipment, a new bonding process and radiation shielding for storage of radioactive materials covered in bulletin.

65. FLUXLESS SOLDERING—Aeroprojects, Inc. Bulletin SB-6A on ultrasonic fluxless soldering tells what it is and how it works.

66. REGULATORS—Liquid Carbonic Co. Firm's bulletin 230 presents data on regulators, including standard two-stage, heavy-duty two stage, bantam single stage, etc.

67. POSITIONERS—Cayuga Machine and Fabricating Co., Inc. Bulletin 5706 covers positioners with center post design, includes specifications.

68. TUBING STEELS—Babcock & Wilcox Co. Technical data card 153-B is titled "Stress rupture data on B&W croloys, and other tubular materials for high temperature service."

69. INDUCTION HEATER — Allis-Chalmers Mfg. Co. Construction and design features of high-frequency induction heaters and melting furnaces described in bulletin 12B6430B.

70. PORTABLE CUTTER—Indiana Oxygen Co. Model 1000 portable "Cut-a-line," which carries 1 or more cutting torches, is described in illustrated pages.

71. TESTING REACTOR—Atomic Industrial Forum, Inc. "A new approach to a materials testing reactor," is title of reprint of article by Alan R. Gruber, paper 57, AIF 34.

72. SEAM WELDING — Taylor-Winfield Corp. Bulletin SP-7A explains techniques of making and testing seam welds in low carbon steels and stainless steels. Includes tables, charts.

73. SILICON DIODE—International Rectifier Corp. Engineering data sheet SR-154 covers silicon diode alternates for germanium diodes.

74. TUNGSTEN CARBIDE—Kennametal, Inc. "Kennametal Kenplate," tungsten carbide surfacing, is covered in booklet. Includes diagrams.

75. RECONDITIONING — Caterpillar Tractor Co. Using track assemblies as example, 8-page booklet "Golden opportunities" illustrates rebuilding of sprockets, idlers, track links, flanges, roller bushings, etc.

76. STEEL TERMS—LaSalle Steel Co. "Simplified steel terms," Data bulletin No. 6, is a 32-page glossary of steel terms.

77. ARC WELDER—Brennen, Bucci and Weber, Inc. 200 amp, 50% duty cycle portable arc welder model 200 AW is detailed in folder.

78. INDUCTION HEATING—Magnethermic Corp. "3 minutes with induction heating," gives a,b,c's of induction heating.

79. GAS, ARC WELDING—Air Reduction Sales Co. 48-page catalog ADC 848B on supplies and accessories for gas and arc welding contains over 100 illustrations.

80. PIPE AND TUBING—Babcock & Wilcox Co. Technical Data Card 185 reports on titanium metal pipe and tubing. Includes sizes and tolerances, mechanical and physical properties, etc.

81. SAFETY GLOVES—Advance Glove Mfg. Co. Safety gloves and clothing from finger guards to rubber boots covered in catalog.

82. TORCHES—Liquid Carbonic Co. Bulletin NWSA 220 presents new torches for welding and cutting.

83. MANIPULATORS—Cayuga Machine and Fabricating Co., Inc. Bulletin No. 5705 details welding head manipulators, includes pictures, special features.

84. PROTECTIVE CREAMS—The Chemical Corp. Line of skin protective creams, waterless cleaners and work lotions covered in booklet.

85. FIRE EXTINGUISHER—General Detroit Corp. Pressurized water-type fire guard detailed in folder, includes specifications.

86. INDUCTION HEATING—Magnethermic Corp. Publication "3 minutes with induction heating" gives analysis, applications of induction heating.

87. SOLENOIDS—Automatic Switch Co. Catalog 57-S5 gives applications of solenoids, includes specifications, designs, etc.

88. BACKING RINGS—Sperry Products, Inc. Reprint 50-888 of Welding Journal article, "Backing ring elimination permits ultrasonic testing and avoids cracking at piping welds."

89. WELDER—Dix Engineering Co., Inc. Illustrated brochure on automatic welding machines highlights problems in welding automotive parts.

90. CUT-OFF WHEELS—Wallace Supplies Mfg. Co. "Which abrasive cut-off wheel is the right wheel?" is a 30-page booklet covering all types of abrasive wheels.

91. PROTECTIVE COATING—Oakite Products, Inc. Bulletin covers "CrysCoat HC," a zinc phosphate material for tank application to protect steel against corrosion.

92. PIPE FABRICATION—Vogel Tool & Die Corp. Pipe and tubing fabrication discussed on illustrated page. Operations include notching, shaping, cutting and bending.

93. FLOW CONTROL—Syntron Co. Flow control valves, selenium rectifiers, infrared heating elements and panels, power tool, etc., are listed in 50-page catalog 5712.

94. CUT-OFF MACHINES—Beaver Pipe Tools, Inc. Abrasive cut-off machine No. 20 detailed in folder. Includes specifications, illustrations.

95. FLEXIBLE DUCTING—Flexible Tubing Corp. Ducting designed exclusively for low and high pressure air conditioning system is covered in folder.

96. AIR GAS BLOWERS—Lamson Corp. "The right pressure for the job!" is bulletin on air, gas blowers. Includes low and high pressure systems.

97. HOSE CLAMPS—Punch-Lok Co. Tension-air Model TA-1 hose clamping machine with clamp remover for coupling industrial hose is detailed in illustrated sheet.

98. X-RAY DIFFRACTION—Philips Electronics, Inc. Booklet covers 71 "Questions and answers on X-ray diffraction, diffractometry and spectrography."

99. TIG WELDING—Air Reduction Sales Co., Inc. Revised 24-page catalog 2300 on Tig welding includes new items such as Model HMC-A weld cycle control, spot welding gun, etc.

100. WELDMENTS—American Welding and Mfg. Co. 20-page products catalog pictures titanium and aluminum rings, carbon steel rings, precision rings, etc. Section lists special services offered, another gives time saving technique.

101. FEEDBACK SYSTEMS—Oilgear Co. Hydraulic open-loop electro-feedback systems discussed in 8-page report.

THE WELDING SHOPPER

UNDISPLAYED RATE

(Not available for equipment advertising)
90c a line, minimum 6 lines. To figure advance payment, count 5 average words as a line.

INDIVIDUAL EMPLOYMENT WANTED advertising rate is ½ the above rate; minimum $5, payable in advance.

DISPLAYED RATE

The advertising rate is $8.75 per inch for all advertising appearing on other than a contract basis. Maximum size of display ad is 4 col. in. Contract rates quoted on request. AN ADVERTISING INCH is measured ⅞ in. vertically on one column, 3 columns—30 inches—to a page.

WHERE TO BUY

9314 Berenice (Schiller Park), Chicago, Ill

HELP WANTED

WANTED

Welding Equipment Sales Manager-Export

Harnischfeger Corporation, Milwaukee, Wis. Has an excellent position open for a man with the following minimum qualifications.

AGE:	30 to 40 Years
EDUCATION:	Minimum of two years technical training.
EXPERIENCE:	Minimum of five years in sales of welding equipment.
LANGUAGE:	Fluent Spanish.
TRAVEL:	Willing to travel 50% of time.
LOCATION:	Relocate home to Milwaukee.
SALARY:	To $10,000.00/year to start, with subsequent bonus arrangement.

Duties will include administration of direct and dealer sales and promotional activities of P&H Welding Equipment in South, Central and Latin America.

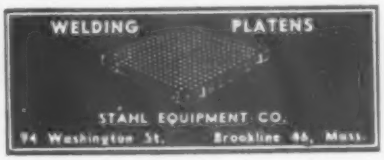
Write complete resume to:

Assistant Personnel Director
HARNISCHFEGER CORPORATION
4400 West National Avenue
Milwaukee 46, Wisconsin

SCHOOL

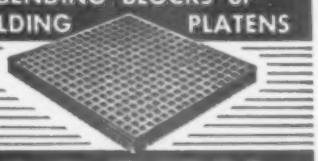
WELDING—A profitable trade. Demand for trained men. Learn quickly at best equipped school in U. S. Non-profit. G. I. approved. Catalog free. Write: Hobart Welding School, Box U-681, Troy, Ohio.

EQUIPMENT FOR SALE



HEAVY DUTY TURNING ROLLS
for rotating pressure vessels, pipe and cylindrical bodies for welding
Aronson
MACHINE CO., ARCADE, N. Y.
A COMPLETE LINE of WELDING POSITIONERS

CUTTING MACHINES, AIRCO Camo & Radiagraphs and NATIONAL No. 5.
SEAM WELDER, Progressive, 150 KVA, New.
SPOT WELDER, National, 40 KVA, Used.
CUTTING TORCHES, Used, Oxweld, Airco, Harris.
WELDING TORCHES, New, Rego GV.
BRONZE—STAINLESS—AMPCOTRODES.
ELECTRODE HOLDERS.
RALL SUPPLY CO. 51 E. 42nd St., N.Y.C. 17

ACORN
BENDING BLOCKS or WELDING PLATENS

ACORN
IRON & SUPPLY CO.
901 N. Delaware Ave., Phila. 23, Pa.

Bigger—Better—NEW 1958

This cross-indexed volume contains 126 of the best Data Sheets appearing in WELDING ENGINEER in the past 15 years. Yet it costs only $1.40!

See your welding supply distributor or order from:

Welding Engineer
Box 28
Morton Grove, Ill.

AD INDEX

Aeroprojects Inc. 68
Air Reduction Sales Co. 102
Alloy Rods Co. 20
All-State Welding Alloys Co., Inc. 99
Aluminum Co. of America 66, 67
American Chain & Cable Co., Inc.
Page Steel & Wire Div. 71
American Manganese Steel Div. 84
American Optical Co. 73
Ampco Metal, Inc. 57
Ansco X-Ray 27
Anti-Borax Compound Co. 100
Arcair Co. 92
Arcos Corp. 76, 77
Aronson Machine Co. 97
Aro Spot Welder Div. Guthery Machine Tool Corp. 80
Atlas Welding Accessories Inc. 24

Bay State Abrasive Products Co. 18, 19
Becker Bros. Carbon Co. 96

Cam-Lok Div. 85
Carol Cable Co. 59
Chicago Hardware Foundry Co. 100
Columbia Electric Mfg. Co. 100
Contour Marker Corp. 69, 95
Cullen-Friestedt Co. 94

Detroit Testing Machine Co. 98
Dockson Corp. 48
Drawalloy Corp. 79

Eastman Kodak Co. 47
Eisler Engineering Co. 69
Electrons, Inc. 63
Erico Products, Inc. 2
Eutectic Welding Alloys Corp. 51

Federal Machine & Welder Co. 83
Fibre-Metal Products Co. Inside Front Cover

General Aniline & Film Corp. 27
General Electric Co. 21
Guthery Machine Tool Corp
Arc Spot Welder Div. 80

Harnischfeger Corp. 4, 60, 69, 72
Hobart Bros. Co. 1, 101

Independent Engineering Co., Inc. 99
International Nickel Co. Back Cover, 81

Jackson Products Front Cover

Lenco, Inc. 88
Lewis Welding & Engineering, Inc. 89
Lincoln Electric Co. 30
Linde Co. 22, 23, 74, 90, 91

Manhattan Rubber Div. 28
Merrill Bros. 54
Metal & Thermit Corporation 14
Miller Electric Mfg. Co., Inc. 25

National Carbide Co. 92
National Welding Equipment Co. 9
Nedco Co. 94
Norris-Thermador Corp. 88
North American Philips Co. 96
Norton Co. 16

Page Steel & Wire Division
American Chain & Cable Co., Inc. 71
Picker X-Ray Corp. 61, 101
Pressed Steel Tank Co. 53

Rankin Mfg. Co. 26
Raybestos-Manhattan, Inc.
Manhattan Rubber Div. 28
J. C. Renfroe & Sons, Inc. 82
Riegel Textiles Corp. 86
Ruemelin Mfg. Co. 97

Scientific Electric Co. 89
Shawinigan Products Corp. 5
A. O. Smith Corp. 10, 11, 64, 65
Smith Welding Equipment Co. 56
Stulz-Sickles Co. 5

Tee Torch Co. 87
Tempil Corp. 70
Tennessee Fabricating Co. 98
Thermacote Co. 100
Tuffaloy Dept. 93
Tweco Products, Inc. Inside Back Cover, 72

United States Steel Corp. 15

Vickers Inc. 12
Victor Equipment Co. 6, 32

Welding Engineer 62
Welsh Mfg. Co. 93
Westinghouse Electric Corp. 17, 55

Literature offered in ads

125. Aeroprojects, Inc.—Write for further information on ultrasonic welding without fusion.

126. Air Reduction Sales Co.—Catalog 1318, "Airco Electrode Guide", will help you select the right electrode for your specific job.

127. Alloy Rods Co.—Further information available on "Nickel-Arc" electrodes. Send for Bulletin AR-2.

128. All-State Welding Alloys Co., Inc.—Information available on aluminum welding wire, also data sheets.

129. Aluminum Co. of America—Write for booklets and films that show how easy it is to weld, braze and solder aluminum.

130. American Manganese Steel Div.—Write for the "Nicro-Mang" bulletin on a new welding rod to help you solve the cracking problem.

131. American Optical Co.—Further information available on American Optical's safety clothing.

132. Ampco Metal, Inc.—Send for Bulletin W-17 for further information on Ampco-Trode 10 Bare Wire and other Ampco electrodes.

133. Ansco X-Ray—Write for further information on Ansco's x-ray films.

134. Anti-Borax Compound Co., Inc.—Descriptive booklet and samples of case-hardening powder is available.

135. Arcair Co.—Write for further information on your metal removing problems.

136. Aronson Machine Co.—Detailed engineering data available on Aronson's positioners.

137. Aro Spot Welder Div.—Illustrated literature on the new model 410 portable spot welder with "Ski Lift" type gyro suspension.

138. Atlas Welding Accessories Inc.—Further information available on the Atlas line of weld cleaning tools.

139. Bay State Abrasive Products Co.—Information on raised hub disc grinding wheels, reinforced for extra safety.

140. Becker Brothers Carbon Co.—Catalog available giving complete specifications and scaled drawings of carbon welder brushes.

141. Budd Co.—Write for further information on economical welding inspections with portable gamma radiography machines.

142. Cam-Lok Div.—Catalog on the neoprene insulated cable connectors available.

143. Carol Cable Div.—Information on "Dynapower" welding cable available.

144. Chicago Hardware Foundry Co.—Information on "Fuse-Well" cast-iron welding rods and electrodes are available.

145. Columbia Electric Mfg. Co.—Illustrated 8-page catalog on tong-test ac/dc ammeter.

146. Contour Marker Corp.—Information and instruction book on laying out pipe joints.

147. Contour Marker Corp.—Details on establishing and marking a point at any angle.

148. Cullen-Friestedt Co.—"C-F Positioner Catalog" available on low cost welding.

149. Detroit Testing Machine Co.—Write for more information on the ST-1 testing machine.

150. Dockson Corp.—Catalog available on Dockson's goggles, also name of nearest distributor.

151. Drawalloy Corp.—Bulletin 355 DC provides complete information on every grade of Drawalloy welding wire.

152. Eastman Kodak Co.—Wall chart on radiographic data, including film selection, relative speed, and contrast, is available.

153. Eisler Engineering Co.—Catalog No. 93-57 gives complete information on Eisler's spot and wire butt welders and the vertical type press welder.

154. Electrons, Inc.—Write for further information on industrial thyratrons for automation.

155. Erico Products, Inc.—Information available on the "Caddy Type B" electrode holder.

156. Eutectic Welding Alloys Corp.—Welding Data Book giving procedures and theory of welding practice on all metals, is available.

157. Federal Machine & Welder Co.—Write for further data on Federal's "Warco Packaged Production Lines" automated production, from material to product.

158. Fibre-Metal Products Co.—Bulletin No. 41 available on the "Monarch" F-300 face shields.

159. General Electric Co.—New folder available, "X-Ray in Industry."

160. Harnischfeger Corp.—"What You Should Know About Welding Positioners" available.

161. Harnischfeger Corp.—Bulletin R-29 tells about low-hydrogen iron-powder electrodes.

162. Harnischfeger Corp.—Bulletin R-48 is available on heat-treatable electrodes.

163. Harnischfeger Corp.—For further information on iron-powder electrodes write for bulletin R-29.

164. Hobart Brothers Co.—Write for further information on Hobart's No. 10 electrodes.

165. Hobart Brothers Co.—Complete information on the Model ASM-5D Automatic Welding Head for submerged arc welding available.

166. Independent Engineering Co.—Further information available on transporting compressed gases by gas supply trailers.

167. International Nickel Co., Inc.—Write for a complete list of "Inco" welding products including specification data and recommended uses.

168. International Nickel Co., Inc.—"Now You Can Weld Dissimilar Alloys—Easily" available.

169. Jackson Products—Write for further information on the complete line of Jackson's welding equipment and accessories.

170. Lenco Inc.—Further information available on the "Hi-Amp" electrode holders and ground clamps.

171. Lewis Welding & Engineering Corp.—Write for further information on Lewis Automatic Directional Control, and prices.

172. Lincoln Electric Co.—Weldirectory Bulletin 7000.1 available on Lincoln's mild steel electrodes.

173. Linde Co.—Write for further information on the "Heliarc HW-18" hand welding torch, and where you can examine and try it.

174. Linde Co.—Booklet F-1174 available on "Oxweld" flame-cutting torches.

175. Linde Co.—Information on "Prest-Olite" air acetylene outfits.

176. Linde Co.—"Purox Oxy-Acetylene Welding and Cutting Equipment" catalog available.

(Continued on page 106)

WELDING INFO-AIDS

USE THIS CARD for Literature, Catalogs, and Bulletins shown on preceding pages and for those featured in this month's ads as listed opposite and on following page

Also information about

NEW PRODUCTS described on pages 80 to 90

Every month WELDING ENGINEER lists many new catalogs and bulletins available from manufacturers. All are yours for the asking. However, this service is valuable to you only if you use it.

USE POSTPAID CARD →

★ For copies of any manufacturers' bulletins described on these pages, circle the number of the items on card at right. Fill in your name, title, company and address. This has to be done only once on either post card. You need no postage.

★ For additional information on New Products described in this issue, circle the numbers and the items that interest you. The New Products section begins on page 80.

WARNING!

Illegible or incomplete addresses may keep you from receiving the information you desire. And remember, cards postmarked after the deadline date cannot be processed.

★ **Post card not valid after three (3) months. After that time has elapsed, use your own letterhead to describe fully the information and/or literature wanted.**

Name_____ Title_____

Company_____

Address_____

City_____ State_____ 6/58

NOT GOOD AFTER SEPTEMBER 1, 1958

WELDING ENGINEER, P. O. Box 28, Morton Grove, Ill.

Please send me without obligation further information about the following:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 32, Morton Grove, Ill.

Welding Info-Aids,
Welding Engineer
P.O. Box 28
Morton Grove, Ill.

Literature offered in ads

(Continued from page 104)

177. **Manhattan Rubber** Div.—Further information available on Manhattan's Meldiscs for your grinding and cutting requirements.

178. **Merrill** Brothers—Information on lifting clamps, twin and drum lifters, drum tilters and other material-handling devices.

179. **Metal & Thermit Corp.**—For reference material prepared to aid you in your stainless welding operations, write for the "Murex Stainless Fact File."

180. **Miller Electric Mfg. Co.**—Further information on Model SRH and Model SR welders available.

181. **National Carbide Co.**—Information on calcium carbide available, also name and address of nearest supplier.

182. **National Welding** Equipment Co.—Write for brochure No. 8 on air-gas torches.

183. **Nedco Co.**—Send for catalog showing the Aerial type grinders and other Nedco tools.

184. **Norris-Thermador** Corp.—Write for specifications on all sizes of Norris-Thermador's acetylene cylinders.

185. **North American** Philips Co.—Write if interested in distributorship of Elmet brand tungsten welding electrodes.

186. **Norton Co.**—For reducing operators fatigue and grinding costs write for further information on the "Touch of Gold" process.

187. **Page Steel & Wire** Div.—Welding wire packaging chart, Submerged Arc and Inert Gas Welding wire folder and Gas Welding Rod booklet available.

188. **Picker X-Ray** Corp.—Write for further information on the new "Andrex 160KV" portable x-ray.

189. **Picker X-Ray Corp.**—Further data available on Picker's "Gardray" radiation badges.

190. **Pressed Steel Tank Co.**—Write for detailed facts and prices on Hackney high pressure gas cylinders.

191. **Rankin Mfg. Co.**—Ran-Check Chart and Stickers available.

192. **J. C. Renfroe & Sons, Inc.**—Catalog on complete line of lifting clamps available.

193. **Riegel Textile Corp.**—Write for further information on Riegel welder's gloves.

194. **Ruemelin Mfg. Co.**—Bulletin 37-E explains how to keep plant air clear of welding fumes.

195. **Scientific Electric Co.**—Write if interested in free demonstrations of the induction heater.

196. **Shawinigan Products** Corp.—Information on calcium carbide and name of nearest distributor.

197. **A. O. Smith** Corp.—Write for further information on A. O. Smith's electrodes used in the rocket engine tests made by Kaiser steel.

198. **A. O. Smith** Corp.—Write for further information on the A. O. Smith convertors, to convert any a-c welder to d-c.

199. **Smith Welding** Equipment Corp.—Bulletin HHP-1 on Smith's new Air-LP Gas torch kit.

200. **Stulz Sickles Co.**—Write for "How-to-do-it" Bulletin and name of nearest distributor.

201. **Tec Torch Co., Inc.**—Write for full information on the Tec "Visuweld" Torch and other "Visuweld" equipment.

202. **Tempil** Corp.—Write for further information on "Tempilstiks," and booklet "How Temperatures are Measured."

203. **Tennessee Fabricating Co.**—Catalog available showing over 400 casting designs.

204. **Thermacote Co.**—Further information on Thermo Tip Cleaners.

205. **Tuffaloy Dept.,** Air Reduction Sales Co.—Catalog and price list available on Tuffaloy spotwelding tips, welding tip holders and adapters.

206. **Tweco Products,** Inc.—Write for Tweco-Lite bulletin on aluminum welding cables.

207. **Tweco Products,** Inc.—Information on Tweco's laminated glass cloth insulation with melamine resin.

208. **Vickers Inc.**—Bulletins EPD 7116-1 explains the unusual "Controlarc" dc welder.

209. **Victor Equipment** Co.—Write for further information on Victor's cutting torches and tips.

210. **Victor Equipment** Co.—Victor Hardfacing Manual shows you right rod to use and how to apply it.

211. **Welsh Mfg. Co.**—Write for further information on cushion-soft frames for comfort-fit eye protection.

212. **Westinghouse** X-Ray Dept.—Information available on the full line of portable, stationary and fluoroscopic radiographic equipment.

213. **Westinghouse** Electronic Tube Div.—Detailed data available on Thyratron tubes.

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 32, Morton Grove, Ill.

Welding Info-Aids,
Welding Engineer
P.O. Box 28
Morton Grove, Ill.

Name_____ Title_____

Company_____

Address_____

City_____ State_____ 6/58

NOT GOOD AFTER SEPTEMBER 1, 1958

WELDING ENGINEER, P. O. Box 28, Morton Grove, Ill.

Please send me without obligation further information about the following:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250

this is Super-Mel®

TWECO'S laminated glass cloth insulation with melamine resin

IT WILL NOT BREAK
IT WILL NOT BURN
IT WILL NOT CARBON CHAR

and only TWECOTONG® has it!

Tip insulators on your electrode holders take an awful beating. Searing arc heat causes most materials to carbonize quickly and conduct current, destroying their insulating value. Slam-bang handling and dropping soon cracks and shatters brittle insulation. Only SUPER-MEL has proved its ability to stand up in tough arc welding service. This fireproof insulation is built up of many layers of strong, woven glass cloth, laminated and bonded together under great pressure with pure melamine resin. It will never char or carbonize. It will remain sound for month after month, in spite of hard service and abuse. Standardize on SUPER-MEL . . . exclusively yours on TWECOTONG electrode holders.

SEE YOUR LOCAL WELDING SUPPLY DISTRIBUTOR

Tweco

MANUFACTURERS: ARC WELDING ELECTRODE HOLDERS, GROUND CLAMPS, CABLE CONNECTORS, TWECO-LITE ALUMINUM WELDING CABLE

PRODUCTS, INC.

P. O. BOX 666 • Factory: Boston at Mosley • Phone AMherst 5-1684 • Wichita 1, Kansas

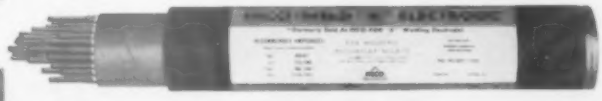
Now—two ways to weld dissimilar alloys

...and most problem joints

1. Inco-Weld "A" Wire for inert-gas metal arc welding . . .

Production weld dissimilar alloys with the new Inco-Weld "A"* Wire and the inert-gas metal arc process. Inco-Weld "A" Wire gives you all the advantages you get from the electrode with this important extra:

An Inco-Weld "A" Wire deposit can be age-hardened. This property is extremely important if you're welding super alloys that are to be age-hardened after fabrication.



2. Inco-Weld "A" Electrode for metal-arc welding . . .

Field weld dissimilar alloys and hard-to-get-at joints with Inco-Weld "A"* Electrode (with the green flux coating) and the metal-arc process. Along with its name change (formerly sold as Inco-Rod "A" electrode) you'll find it's been improved to give even greater hot ductility.

Either way – with wire or electrode – you get excellent operability in all positions . . . easy slag removal . . . spray-type arc . . . corrosion resistance in most cases equivalent to or better than either of the alloys being joined.

Get this new booklet –

"Now You Can Weld Dissimilar Alloys – Easily"

Illustrated with many case histories on problem welds solved with both electrode and wire . . . this booklet gives results on test data involving a wide variety of dissimilar alloys welded successfully. For your copy, write:

*Trademark of The International Nickel Company, Inc.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street INCO New York 5, N. Y.

INCO WELDING PRODUCTS

electrodes • wires • fluxes